

Some Observations on the Chemical Control of Coconut wilt Disease in Tamil Nadu

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ABSTRACT

A fungicidal trial for the control of coconut wilt was conducted at Thambikottai (Thanjavur district) during the year 1965 - 69 with the following treatments: Bordeaux mixture, wet cersan, wettable sulphur, Pentachloro-nitro-benzene, copper oxychloride + BHC and tar. The chemicals were applied at quarterly intervals for a period of three years on healthy and diseased trees to study its curative and prophylactic action. The data collected over a period of four years has indicated the superiority of Bordeaux mixture both for its curative and prophylactic action while copper oxychloride + BHC and tar were promising for their prophylactic effect. Further, Bordeaux mixture had the effect of arresting the bleeding patches. The treatments did not exert any influence on the yield behaviour.

INTRODUCTION

Tamil Nadu with 1.3 lakh acres under coconut occupies an important place in the Indian Union both in area and production. Coconuts are mostly raised under rainfed conditions along the east coast. Among the several factors responsible for loss in yield the wilt disease of coconut is an important one in the coastal sandy areas. The exact cause of the disease is still under investigation and from the evidence available so far it appears to be a complex disease in which the fungus *Ganoderma lucidum* is also involved in the final stages. This disease though endemic in the coastal areas attracted the attention of grower and agricultural scientists only after the cyclones of 1952 and 1955 in Thanjavur district where the intensity of the disease is particularly severe. This is a fatal disease attacking young trees in the age group of 10-25 years and recovery is very rare.

As it is not desirable to wait till the causes of a complex disease of a perennial crop are determined it was thought appropriate to initiate trials with certain chemicals in an attempt to control coconut wilt. Therefore, an observational trial was conducted in private gardens at Thambikkottai (Thanjavur district) under the coconut wilt investigation scheme during the years 1965-68, the results of which are presented in this paper.

MATERIAL AND METHODS

The experiment was conducted in different gardens selecting trees of uniform age (20-25 years), growth and pathological conditions. Each treatment comprises of four healthy and four diseased trees selected at random in separate gardens.

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The following treatments were included:

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| <ol style="list-style-type: none"> 1. Bordeaux mixture 1% 2. Mercurine 0.1% 3. Wet ceresan 0.1% 4. Wettable sulphur 0.5% 5. Pentachloro nitro-benzene 0.6% 6. Copper oxychloride 0.25% + BHC 0.1% 7. Application of tar on stem - local practice. 8. Control (untreated) | Applied at 40 litres per tree per application. |
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Twelve applications were given at quarterly intervals beginning from November, 1965 and ending in August, 1968. Regular observation on the number of fresh bleeding patches produced on the stem, bleeding from old patches, maximum height of occurrence of bleeding patches, final wilting and condition of crown were recorded at monthly intervals. The initial condition of trees were also recorded before taking up the trial. The observations were recorded upto August 1965 i.e., a year after the last application of chemicals.

The disease index was arbitrarily assessed according to the following formula in which all the attributes of the disease have been taken into account according to its importance.

$$\frac{A}{10} + \frac{B}{10} + C \times 10 + D \times 100 \text{ where}$$

'A' is the number of fresh patches produced, 'B' the number of fresh bleeding from old patches, 'C' the height of occurrence of patches and 'D' the total number of trees wilted in that treatment. Only well defined bleeding patches of not less than 1-2 cm size were considered as diseased patch.

RESULTS

The consolidated treatment-war data collected from four healthy and

four diseased trees for different attributes of the disease are given in Table 1 along with the disease index which gives an overall assessment of the treatments.

It would be seen from the data that in respect of number of fresh bleeding patches and fresh bleeding from old patches the treatment bordeaux mixture has afforded maximum curative effect (as inferred from the infection on diseased trees) while copperoxychloride + BHC, bordeaux mixture and tar were promising for its prophylactic action (as inferred from the infection on healthy trees). The height of bleeding patches and extent of wilting was comparatively less in bordeaux mixture and copper oxychloride + BHC treatments. From the disease index which gives an overall assessment of the treatments, bordeaux mixture showed maximum efficacy as a curative treatment while copper oxychloride + BHC, bordeaux mixture and tar indicated some prophylactic action. Considering the combined prophylactic and curative action, the treatment bordeaux mixture alone was found promising. The progress of infection was observed to be more rapid in the diseased series of trees as could be normally expected.

The annual rate of incidence of fresh bleeding patches which gives an idea of the progress of infection in the different treatments and yield data are given in Tables 2 and 3. The data would indicate that the maximum treatmental effect i.e., considering both healthy and diseased trees was given by bordeaux mixture

TABLE 1. Intensity of infection in different treatments

Attribute of the disease	Bordeaux mixture	Mercurine	Wet cerasan	Wettable sulphur	PCNB	Copper oxy-chloride	Tar	Control
No. of fresh bleeding patches :								
Healthy	14	390	720	291	506	—	24	1266
Diseased	108	374	1004	953	1458	737	825	1846
Total	122	764	1724	1244	1964	737	849	3112
No. of fresh bleeding from old patches :								
Healthy	26	605	945	417	690	—	34	1200
Diseased	104	758	1706	1568	2736	1517	912	2159
Total	130	1363	2651	1985	3426	1517	946	3359
Height of occurrence of bleeding patches (in metres):								
Healthy	2.33	2.20	2.50	2.42	3.73	—	3.03	3.36
Diseased	4.01	6.35	9.32	7.28	7.35	8.23	7.90	11.22
Total	6.34	8.55	11.82	9.70	11.08	8.23	10.93	14.58
No. of trees wilted :								
Healthy	—	—	1	1	1	—	—	—
Diseased	2	3	4	4	3	2	4	3
Total	2	3	5	5	4	2	4	3
Disease index :								
Healthy	27	122	292	195	257	—	36	280
Diseased	261	477	764	725	793	508	653	813
Total	288	599	1056	920	1050	508	689	1093

(Av. 7.3 patches) followed by copper oxychloride+BHC [Av. 31.1 patches]. The maximum prophylactic effect on healthy trees was observed on copper-oxychloride+BHC (which did not show any infection) followed by bordeaux mixture. As a curative treatment on diseased trees bordeaux mixture has

recorded maximum efficacy [12.2 patches] followed by mercurine [47.4 patches]. The annual incidence of bleeding patches is seen to vary from year to year for all treatments except bordeaux mixture which showed progressive decrease in both healthy and diseased series.

TABLE 2. Annual rate of incidence of bleeding patches in different treatments

Treatment	Average no. of patches per tree										Average of H & D
	1965 - 66		1966 - 67		1967 - 68		1968 - 69		Average		
	H	D	H	D	H	D	H	D	H	D	
Bordeaux mixture	3	24	4.5	11.6	1	1	1	—	2.4	12.2	7.3
Mercurine	49	55	15	19.5	111.5	110	40.5	5	54	47.4	50.7
Wet ceresan	58	61	202	32	162	50	44	287	117	107.5	112.2
Wettable sulphur	25	101	41.5	75.3	53.3	132	13	52	35.7	90.1	62.9
PCNB	5.5	75.5	42.6	65.3	79.6	175.2	64	47	47.9	90.8	69.3
Copper oxychloride+BHC	—	99.7	—	54	—	36.3	—	59	—	62.2	31.1
Tar	—	169	5	88.5	7	—*	2.6	—*	48	128.8	88.4
Control	—	283.6	4	235	424.5	91	198.5	6	157	153.9	155.4

Note: * The bleeding patches could not be recorded since all the four trees in the treatment had wilted.
H: Healthy trees D: Diseased trees

TABLE 3. Yield data in different treatments

Treatment (4 trees each)		Average yield per tree (No. of nuts)			Average for three years	Average for H & D series
		1966 - 67	1967 - 68	1968 - 69		
Bordeaux mixture	H	29	114	112	85	78
	D	34	59	119	71	
Mercurine	H	21	50	76	49	58
	D	34	88	83	68	
Wet ceresan	H	40	79	77	65	55
	D	40	73	22	45	
Wettable sulphur	H	36	54	88	59	40
	D	16	26	24	22	
PCNB	H	77	76	74	76	80
	D	80	114	60	85	
Copper oxychloride+BHC	H	47	63	68	59	62
	D	59	66	73	66	
Tar	H	64	213	171	149	85
	D	31	11	0	21	
Control	H	40	44	93	59	56
	D	48	60	24	44	

The yield is seen to vary from year to year. The maximum average yield for three years was recorded in tar (healthy) followed by bordeaux mixture (healthy) and PCNB (diseased). On treatment basis i.e., healthy and diseased trees put together, tar had recorded maximum yield followed by PCNB. As the yield behaviour is conditioned by several external factors and inherent quality of trees it would be too far fetched to place much emphasis on the treatmental differences.

DISCUSSION

Attempts were made to control the coconut wilt disease by use of fungicides and some insecticides though the role of the fungus *Ganoderma lucidum* in the wilt complex is still under investigation. The fungus is, however, associated with some of the trees in the advanced stages of the disease. The results of the fungicidal trial has indicated some promise in controlling the disease with bordeaux mixture which possesses good curative and prophylactic action. As a prophylactic treatment alone, copper oxychloride + BHC and tar have also given encouraging results. Whether the curative action of bordeaux mixture could be attributed solely to its fungicidal value or to its ameliorating effect on the soil complex requires further study. Much emphasis could not be placed on the prophylactic action of the fungicides

since there is the possibility of some of the trees under healthy series being inherently resistant to the disease. However, prophylactic treatment with tar and copper oxychloride + BHC can be tried in heavily infected areas. But as a curative treatment bordeaux mixture which is capable of arresting the bleeding patches can be recommended for application to trees in the initial stages of the disease. Along with this tar can also be applied to the stem after scooping out diseased tissues to give additional protection to the trees. The treatments may not prove to be effective on trees in advanced stages of the disease. Regarding the number of applications required it is inferred from the present studies that quarterly applications for three years may be sufficient. However, the economic dosage and frequency of application have to be determined from future studies. The treatments do not seem to have exerted any influence on the yield during the short period of the observations and it is apparently dependent on the inherent quality of trees conditioned by certain external factors.

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