

ECONOMIC AND EFFECTIVE MANAGEMENT OF POWDERY MILDEW DISEASE OF HEVEA RUBBER IN SOUTH INDIA

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ABSTRACT

Experiments were conducted to find out methods of economic and effective management of powdery mildew disease of mature as well as young *Hevea* rubber plants. In mature plantations it was found that 4 rounds of alternate application of sulphur dust (12 kg/ha/round) and tridemorph 1.5 per cent dust (10 kg/ha/round) gave better control of the disease than 4 rounds of sulphur dusting at 12 kg/ha/round. However, two rounds of tridemorph 1.5 per cent dust at 10 kg/ha/round with one round of sulphur dust at 12 kg/ha/round in between was the most effective. In an attempt to reduce the dosage, two rounds of tridemorph 1.5 per cent dust at 7 kg/ha/round with one round of sulphur dust (12 kg/ha/round) in the middle, was found to be equally effective. In young rubber plantations, 4 rounds of spray application of 0.025 per cent carbendazim in combination with 0.1 per cent wettable sulphur was equally effective with carbendazim, and triadimenol and gave more economic disease control.

INTRODUCTION

Till recently, sulphur fungicides were the only solution for the control of powdery mildew disease of rubber caused by *Oidium heveae* Steinm. But in recent experiments conducted in India, systemic fungicides like bitertanol, tridemorph and carbendazim were found superior to sulphur fungicides in controlling this disease (Krishnankutty and Edathil, 1987; Edathil *et al.*, 1988a and 1988b). The standing recommendation of the Rubber Research Institute of India for the control of powdery mildew disease in mature trees is the use of three to five rounds of 325 mesh fine sulphur dust at weekly to fortnightly intervals. For protecting young plants in the field and in nurseries spray application of wettable sulphur is recommended (Radhakrishna Pillai *et al.*, 1980). Due to peculiar climatic factors, treatments with inorganic sulphur fungicides may not be effective in certain years (Edathil *et al.*, 1988a). In such conditions use of systemic fungicides is the only remedy. But the control operation with these fungicides is costly. The present study was aimed at identifying methods of economic and effective powdery mildew disease management in *Hevea*.

MATERIALS AND METHODS

Dusting experiments on mature trees

Experiments were conducted during January-March in three locations viz., Vaikundam Estate, Kanyakumari, Tamil Nadu (PB 5/139); Cheruvally Estate, Erumely, Kerala (PB 235) and Lahai Estate, Pathanamthitta, Kerala (PB 5/51) with four treatments each. The treatments were;

1. 1st and 3rd rounds with sulphur dust 70%, 2nd and 4th rounds with tridemorph 1.5% dust.
2. 1st and 3rd rounds with tridemorph dust 1.5%, 2nd round with sulphur dust 70%
3. 1st and 2nd rounds with sulphur dust 70% and 3rd round with tridemorph 1.5% dust
4. All the 4 rounds with sulphur dust 70%

Quantity of fungicides used was; tridemorph 10kg/ha/round and sulphur dust 12 kg/ha/round; and plot size was one hectare each. The interval between rounds was 10-15 days. The power duster was carried along every fourth row in the early morning hours while dusting. This experiment was continued during 1989 disease season also with some modifications

in the treatment and dosage. The treatment No.3 of 1988 was discarded as it was not effective. The dose of tridemorph dust 1.5% was reduced to 7 kg/ha/round as the reduced dose was sufficient to cover one hectare area of mature rubber. The sulphur dust dose was not changed.

Spraying experiment on young rubber plants

The experiments were laid out in randomized block design in one year old plants of PB 311 during 1988 and RR11 105 during 1989 at Mundakayam and in PB 235 during 1990 season at Thodupuzha. There were 12 treatments during 1988 and 1989 seasons. The treatments are: 1. Carbendazim (Bavistin) 0.025%, a.i., 2. Bitertanol (Baycor 25 WP) 0.025%, 3. Triademecon 50 WP (Bayleton 25 WP) 0.025%, 4. Dinocap (Karathane 48 EC) 0.1%, 5. Triforine (Saprol 15 EC) 0.03%, 6. Mancozeb (Dithane M-45 75 WP) 0.2%, 7. Thiophanate methyl (Topsin - M 70 WP) 0.07%, 8. Dithianone (Delan 75 WP) 0.075%, 9. Tridemorph (Calixin 80 EC) 0.1%, 10. Wettable sulphur (Sulfex 80 WP) 0.2%, 11. Water spray (control) and 12. Unsprayed control.

During 1990 there were 10 treatments involving combination of fungicides. The treatments are 1. Carbendazim (Bavistin 50 WP) 0.05%, 2. Carbendazim (Sten 50 WP) 0.05%, 3. Benomyl (Benlate 50 WP) 0.05%, 4. Bitertanol (Baycor 25 WP) 0.025%, 5. Triademecon (Bayleton 25 WP) 0.025%, 6. Wettable Sulphur (Sulfex 80 WP) 0.2%, 7. Bavistin 0.025% + Sulphur 0.1%, 8. Bavistin 0.05% + Sulfex 0.2% alternately, 9. Water spray (Control) and 10. Unsprayed control. There were 3 replications and the plot size was 750 m² containing 30 plants each. Four rounds of spraying

were given in each season @ 100 ml per round per plant at an interval of 10-15 days with high volume knap-sack sprayer.

Disease assessment

In the dusting experiment on mature trees, disease intensity was assessed after each round of dusting as severe leaf fall occurred from the beginning. But in spray trial on young plants, assessments were made after two rounds of application and at the end of the disease season as there was no regular wintering. In both the cases, 10 trees/seedlings were selected at random from the middle of each plot. Leaf samples were collected from the terminal flushes of two of the lower branches selected at random from each of these selected plants. These leaves were graded on a 0-4 disease scale and percentage disease intensity was calculated as per the formula of Horsfall and Heuberger (1942).

RESULTS AND DISCUSSION

The results indicated that the treatment No. 2 involving dusting of Tridemorph in first and third rounds and sulphur dusting in the second round was superior to all other treatments at all the three locations during 1988 and 89 in controlling the disease on mature trees (Tables I & II). The better protection obtained with 3 rounds of application (Treatment No. 2) against 4 rounds (Treatment No. 1) is due to the fact that the first round was with Tridemorph in the former treatment. Considering the better result and reduced cost, treatment No. 2 of 1989 can be recommended for the control of powdery mildew disease on mature

Table I. Powdery mildew intensity (%) in mature trees in 1988

Name of Estate/ clone	Year of planting	Mean disease intensity (%) in treatments			
		1	2	3	4
Vaikundam PB 5/139	1966	58.08	36.75	77.66	87.16
Cheruvally PB 235	1975	40.08	33.83	50.83	62.58
Lahai, PB 5/51	1970	36.00	32.83	39.25	44.50
Mean		44.72	34.47	55.91	64.74

Table II. Powdery mildew intensity (%) in mature trees in 1989

Name of Estate clone	Year of planting	Mean disease intensity (%) in treatments		
		1	2	3
Yaikundam PB 5/139	1966	36.00	32.08	37.50
Cheruvally PB 235	1975	66.25	49.92	77.25
Lahai, PB 5/51	1970	72.67	62.58	75.83
Mean		58.30	48.19	63.33

trees. This works out to Rs. 180/ha per season.

The results of the trial on young rubber plants (Table III) showed that in 1988 season, carbendazim, bitertanol, triademefon and thiophanate methyl were significantly superior to controls. Water spray and unsprayed controls were at par and registered maximum disease intensity. In 1989 none of the treatments was found significant as there was no disease incidence

in the experimental area. In 1990, carbendazim in combination with wettable sulphur gave maximum disease control (Table - IV). However, carbendazim, bitertanol, and triademefon were also at par with this treatment and all these four treatments were significantly superior to controls. In 1988, the water spray and unsprayed controls were at par and registered maximum disease intensity. The combined effect of a systemic and protectant fungicide gave maximum disease control.

Table III. Result of the spraying trial in young plants 1988

Sl. No.	Treatment	Fungicide concentration (%)	Mean disease intensity (%)
1	Carbendazim	0.025	3.95 (16.08)
2	Bitertanol	0.025	4.72 (22.23)
3	Triademefon	0.025	3.92 (15.67)
4	Dinocap	0.100	5.13 (26.42)
5	Triforine	0.300	5.39 (29.08)
6	Mancozeb	0.200	5.13 (26.33)
7	Thiophanate methyl	0.070	4.47 (20.17)
8	Dithianone	0.075	5.06 (25.58)
9	Tridemorph	0.100	5.15 (26.58)
10	Wettable Sulphur	0.200	4.92 (24.25)
11	Water spray control	0.000	5.32 (28.83)
12	Unsprayed control	0.000	5.37 (28.83)
	General mean		4.88 (22.66)
P (0.05)			SE. 0.20 CD. 0.60

- Note : 1. The figures in parenthesis indicate the corresponding % disease intensity.
2. SE. and CD. are for transformed figures only (square roots)

Table IV. Result of the spraying trial in young rubber plants during 1990

Sl. No.	Treatment	Fungicide concentration (%)	Mean disease intensity (%)
1	Carbendazim (Bavistin)	0.050	27.03 (20.71)
2	Carbendazim (Sten)	"	31.13 (26.75)
3	Benomyl	0.050	32.36 (28.67)
4	Bitertanol	0.025	27.68 (21.59)
5	Triademefon	0.025	30.08 (25.13)
6	Wettable sulphur	0.200	32.19 (28.42)
7	Carbendazim + Wettable sulphur	0.025 + 0.100	26.54 (19.96)
8	Carbendazim and Wettable sulphur alternately	0.050 + 0.200	36.75 (35.88)
9	Water spray control	0.000	43.73 (47.80)
10	Unsprayed control	0.000	45.35 (50.58)

P (0.05)

S E. 2.09

C D. 4.39

Note : 1. The figures in the brackets indicate the corresponding % disease intensity.

2. SE. and CD. are for transformed figures.

Carbendazim in combination with wettable sulphur is cheaper (Rs. 42.80) than all other effective spray treatments (ranging from Rs. 70.00 to 134.00). Hence this treatment can be recommended for controlling powdery mildew disease on young rubber plants.

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