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MANAGEMENT OF CORYNESPORA LEAF FALL (CLF) DISEASE OF RUBBER WITH WATER-BASED FUNGICIDE FORMULATIONS

M.J. Manju, S.P. Idicula*, C. K. Jacob*, K.K. Vinod and Edwin Prem*
Hevea Breeding Sub-Station, Kadaba 574 221, D.K., Karnataka

ABSTRACT

Epidemics of *Corynespora* leaf fall (CLF) disease has been reported from most of the Asian rubber growing countries. Normally, the CLF disease appears during refoliation period causing repeated leaf fall. To develop a tool to the integrated disease management, field experiments were conducted to evaluate the efficacy of water based fungicides for the control of the disease. Water dispersible formulations of four fungicides, *viz.*, mancozeb 75% WP, carbendazim 50% WP, copperoxychloride (COC) 50% WP and bordeaux mixture (BM) 1% were sprayed with an interval of 10-12 days. Among the fungicides tested, mancozeb (2.5g/ l) and carbendazim (1g/l) were found to be more effective. COC (2.5g/l) was also found to be comparable to BM. Mancozeb and carbendazim had showed greater disease suppression than other fungicides. The cost analysis revealed mancozeb to be the best fungicide, being both cheap and effective. Since, the spraying of systemic fungicide is more advantageous for protecting the plant parts not covered by spraying, use of carbendazim can be advocated in older rubber plantations.

Key words: *Hevea brasiliensis*, CLF disease control, *Corynespora cassiicola*, water-based fungicides,

INTRODUCTION

Epidemics of *Corynespora* leaf fall (CLF) disease of *Hevea* rubber caused by *Corynespora cassiicola* (Berk & Curt) Wei. have been reported from almost all of the South and Southeast Asian rubber growing countries. Reports of high economic losses due to this disease in mature plantations have been emerging since late eighties (Edathil *et al.*, 2000). Previously, the disease was considered to be of minor importance and incidence was confined only to nursery and immature plantations (George and Edathil, 1980). Severe outbreak of this disease was reported since 1996 from coastal Karnataka region, affecting the most popular clone RRII 105, which is widely planted in this region (Rajalakshmi, and Kothandaraman, 1996). The disease was normally noticed at the time of refoliation on tender leaves of light green stage. The affected leaves withered very quickly, giving the trees stag-horn appearance. Chemical control of this disease in mature plantations is a cumbersome process, due to the requirement of handling large volume of spray solution and more labour. In small holdings spraying in feasible only where labour and water are available. However, no concrete recommendations are available for effective control of the disease. Therefore, the present investigation was carried out to evaluate the efficacy of few water dispersible fungicides to form a part of the integrated management system for CLF disease.

MATERIALS AND METHODS

The present study was conducted at rubber plantations of the Subramanya Rubber Division of the Karnataka Forest Development Corporation Ltd., and Cochin Malabar Estate at Sampaje, Sullia during 1998 to 2000 disease seasons. The experiments were designed in severely infected eight-year-old RRII 105 plantations for three successive disease seasons and laid out in a block design with five treatments. The fungicides included were mancozeb 75% WP, carbendazim 50% WP, copperoxychloride (COC) 50% WP and

*Rubber Research Institute of India, Kottayam 686 009

Bordeaux mixture (BM) 1%. Along with the treated plots an unsprayed control plot was also maintained. Spraying was carried out using a portable high volume power (horizontal double piston) sprayer.

Treatments were imposed during refoliation period on the appearance of disease symptoms. Four rounds of spraying were carried out at an interval of 10 - 12 days. Disease intensities in experimental plots were recorded before and after the treatments. Observations were taken from ten randomly selected trees on each plot and five leaflets each from four twigs were scored per tree. Severity of the disease was assessed on a 0 to 5 scale based on intensity of spotting and leaf fall. The scale used was, 0 = No disease, 1= Very light (very few spots), 2 = Light (few spots and 10 - 25% leaf fall), 3 = Moderate (lesions and 26 - 50% leaf fall), 4 = Severe (large lesions and 51 - 75% leaf fall), 5 = Very severe (many large lesions and >76% leaf fall). Percentage disease intensity was calculated by using the formula of McKinney (1923). The progressive disease suppression (DS) aith (i=0,1,...,n) round of spraying in the treated plots was calculated and expressed in percentage using the formula,

where, DI*0* and DI*i* are the average disease incidence scores at the initial stage (Oth day) and *i*th day respectively. A comparative cost analysis for the spraying operation was also carried out.

RESULTS AND DISCUSSION

The results of the experiment conducted on CLF disease control using water dispersible fungicides is presented in Table 1. All the treatments offered good control of the disease and recorded less disease intensity as compared to untreated control. Among the fungicide formulations tried, mancozeb 75% WP was found to be superior to other formulations. It recorded the disease intensities of 19.30, 20.20 and 14.90 per cent respectively for the three seasons. Similar trend was observed in plots treated with carbendazim that recorded the disease intensities of 20.10, 22.50, and 17.60 per cent. COC 50% WP showed comparable disease control, which recorded the final disease intensities of 26.60, 27.10, and 25.60 per cent, while those of BM 1% were 30.60, 32.70 and 28.00 per cent respectively for the three disease seasons.

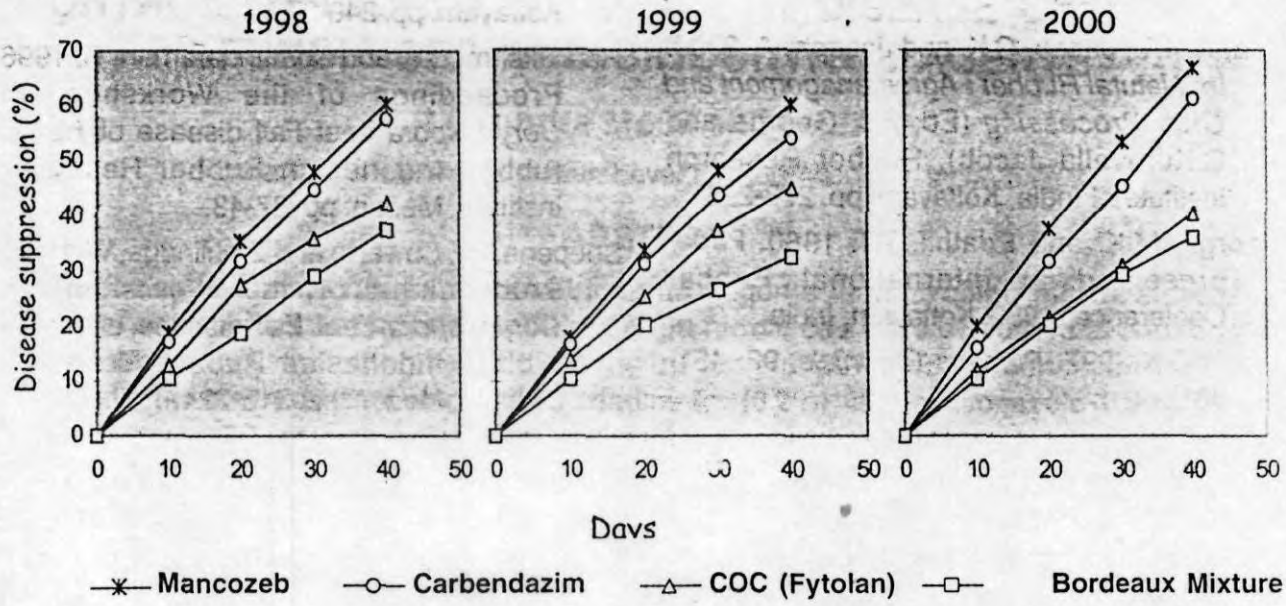
In India, use of BM (Jacob, 1997) and mancozeb (Pillay *et al.*, 1980; Jacob, 1997) for the management of CLF disease in nursery and immature plantations was recommended earlier. No chemical control has been recommended in Sri Lanka, for the disease management in the field (Jeyasinghe and Silva, 1996). In Indonesia, high volume spraying was advocated only in immature plantations as well as in existing susceptible clones which are commercially planted in disease prone areas (Soepena *et al.*, 1996; Sinulingga *et al.*, 1996). The efficacy of

Table 1. Efficacy of water-based fungicides in *Corynespora* leaf fall disease control.

		Disease intensity (%)					
Treatment	Dosage (%)	1998 Initial	1999 Final	2000 Initial	Final	Initial	Final
Mancozeb (75% WP)	0.25	48.400a	19.30d	50.70a	20.20d	45.60a	14.90c
Carbendazim (50% WP)	0.10	47.40a	20.10d	48.60a	22.50d	44.40a	17.60c
COC 50% WP (Fytolan)	0.25	47.70a	26.60c	51.50a	27.10c	41.80a	25.60b
Bordeaux mixture	1.00	48.60a	30.60b	49.20a	32.70b	44.50a	28.00b
Untreated control		49.50a	45.80 a	49.50a	44.80a	41.40a	39.20a
LSD (p=0.05)		3.61	3.66	4.12	3.37	5.99	3.74

Means followed by same letters are not significantly different at 5% level by LSD test.

Fig. 1. Efficiency of water-based fungicide formulations in CLF disease suppression after the individual round of sprying



water-based fungicides in mature plantations mainly depends upon the quality of spraying and repeated applications during the season.

Comparative disease suppression of the different treatments after the individual round of spraying during 1998 to 2000 disease season are illustrated in Fig 1. Mancozeb and carbendazim showed significant increase in disease suppression at a faster rate, while that of COC 50% WP and BM 1% was low. A comparison of the cost of different fungicides used in one hectare plantation (350 trees/ha) per round of application is given in Table 2. Out of the four fungicides, BM was found to be the cheaper option, however, its efficiency in disease control was rather low. BM also involves additional labour and skill for its preparation. On the other hand, second low cost fungicide, mancozeb (Rs 1232.00/ha) gave superior control than all the other treatments.

Table 2. Average cost of fungicides for one round of spraying per hectare.

Treatments	Qty. of fungicide Required (kg/ha)	Cost/round/ha* (Rs)
Mancozeb 75%WP	4.40	1232.00
Carbendazim 50% WP	1.80	1368.00
COC 50% WP	4.40	1830.00
Bordeaux mixture (1%)	17.50 $CuSO_4$	1172.50
	17.50 Lime	
	Copperoxychloride	

* 350 trees/ha.

Fungicide solution required per tree – 5 litre/round. Labour requirement for spraying was same for all treatments.

Since the present study was confined to eight-year-old plantations, the fungicides could be dispersed well on the experimental trees. In older plantations spraying of systemic fungicides can be of more advantage than the contact fungicides. This is because the systemic nature of the fungicides can help in protecting the plant parts not covered by spraying, due to its quick uptake and translocation, thus providing a protection to the subsequent growth from the adverse conditions (Vyas, 1993). Since, carbendazim was found to be equally effective to mancozeb, it could be a better option for older plantations of susceptible clones, although spraying of carbendazim involved slightly higher cost per round.

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