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Fogging with Fungicides to Control Colletotrichum Secondary Leaf Fall of Hevea *Rubber in Malaysia*

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Seven fungicides including four systemics were found effective in the laboratory against Colletotrichum gloeosporioides, *a causative agent of secondary leaf fall of* Hevea *rubber. Field tests from 1982–5 disease seasons showed that captafol at 0.6 kg per hectare a.i. gave good or better control of the disease than most other fungicides evaluated. However, the oil-soluble systemic fungicides propiconazole, penconazole and prochloraz were also promising; they were potent at low dosages. Fungicide treatments reduced disease severity and leaf fall resulting in improved canopy density. The resulting increase in latex yield, however, was insignificant. Factors affecting efficacy of disease control are discussed.*

The major leaf diseases of *Hevea* rubber normally cause defoliation and if severe, loss of yield. This is exemplified by South American leaf blight (SALB) caused by *Microcyclus ulei* (P. Henn. v. Arx), abnormal leaf fall by *Phytophthora* spp., and secondary leaf fall (SLF) by *Oidium heveae* Steinm. and *Colletotrichum gloeosporioides* Penz. When SLF was avoided by artificially defoliating the trees a month ahead of their natural wintering (to hasten refoliation and hardening of leaves, thereby rendering them resistant to infection), 10%–30% increase in latex yield was achieved[1,2]. Similarly, it has been shown that clones susceptible to the disease yielded higher in areas where the disease was less severe[3]. Lim[4] indicated that an increase of latex yield was achieved following fungicide treatment to control the disease.

In Malaysia, Colletotrichum SLF occurs annually on rubber grown in the states of Johore, Selangor, Perak and Kedah. As a long-term measure to contain the disease, planting of tolerant clones in disease-prone areas is recommended[3]. Recently, the disease gained prominence in some places, affecting certain widely planted clones. One such clone is GT 1 which succumbed to severe attacks of Colletotrichum SLF in areas around the southern regions of Perak and Kedah[5].

In laboratory tests, several fungicides were found effective against *C. gloeosporioides*[6–9]. These included chlorothalonil and captafol. Chlorothalonil was subsequently recommended for controlling *C. gloeosporioides* in nurseries or young plantings[6–9]. The chemical suspended in water was sprayed using a mistblower. High volume spraying of chlorothalonil slightly reduced leaf fall by *C. gloeosporioides* in mature trees planted on flat land. However, control of the disease on hilly terrains was unsatisfactory[6,7].

Fungicides applied by fogging had been found effective in controlling Oidium SLF and abnormal leaf fall[10–13], and also Colletotrichum SLF in preliminary trials[11–13]. This paper describes laboratory screening of fungicides and field evaluation of chemicals applied by fogging to control SLF due to *C. gloeosporioides.* The effect of treatments on yield of latex is also reported. Only data obtained during the period between 1982 to 1985 are considered.

MATERIALS AND METHODS

Laboratory Screening of Fungicides

Fungicides were evaluated against *C. gloeosporioides* using three different test methods. Each fungicide was tested at concentrations

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3.9 mg, 7.8 mg, 15.6 mg, 31.3 mg, 62.5 mg, 250 mg and 500 mg per litre of the active ingredients.

Filter paper discs method. This method assessed the effect of fungicides on spores of the pathogen. Fungicide-impregnated filter paper discs (0.5 cm diameter) were inoculated with a drop of spore suspension (5×10^5 spores per millilitre) and placed on malt extract agar (MEA) in petri-dishes. At 48 h and 96 h of incubation, concentrations of fungicides which totally inhibited the growth of the fungus were recorded.

Colony diameter on agar medium. Inhibition of mycelial growth by each fungicide was evaluated by measuring the radial diameter of colonies growing on fungicide-amended MEA in petri-dishes. Fungicides were added either before autoclaving with the media or alcohol stocks were incorporated into the sterilised medium just before it solidified.

Infection of detached leaflets. Leaflets (five days old from clone PB 86) were dipped for 2 min in fungicide suspensions and air-dried. Drops of a spore suspension (1×10^5 spores per millilitre) of *C. gloeosporioides* were pipetted onto the leaflets using an Arnolds applicator. Ten drops were placed on each leaflet and ten leaflets were used per fungicide concentration. The leaves were incubated on wire-meshes placed in plastic boxes lined with moistened filter paper. The percentage reduction in the number of lesions that developed was compared with control.

Fogging of Fungicides

Field trials were conducted to compare the effectiveness of selected fungicides. In all trials except for 1985 when two of the fungicides were sprayed at low volume using a Mini-micron sprayer, the fungicides were fogged using either a tractor-mounted LECO 120D, LECO 120B (Lowndes Engineering Co., USA) or a wheel-drawn Tifa Tiga (Tifa Ltd, USA). For fogging, chemicals were formulated in a spray oil (Shellflex) as described by Lim[14], and applied at four to nine days' intervals at the rate of 8.2 litres per hectare. In the case of mist-blowing with Mini-micron sprayer, the rate was 11.2 litres per hectare. The number of treatment rounds meted out varied from three to five depending on the speed of refoliation in the plots. A fast refoliation required less number of rounds than a protracted one. The Tifa Tiga fogger was pulled along rubber inter-rows or along planting terraces where the terrain was hilly. Similarly, the LECO fogger was moved along inter-rows or specially constructed paths at *Sites B* and *D* where the terrain was hilly. On the other hand, the Mini-micron sprayer was shoulder-carried along each inter-row.

Details of the various field trials conducted over the period between 1982 to 1985 are summarised in *Table 1*. Severity of attack was assessed by recording the number of fallen leaves collected in 4.0 m^2 leaf cages (six cages per replicate) placed at random along tree rows. The intensity of infection on intact light-green leaflets sampled at random was scored on a scale of 0 to 4 (0 = no infection, 1 = very light infection, 2 = light infection, 3 = moderate infection, 4 = severe infection). Canopy density readings assessed by using the Haines[15] mirror were usually taken on the days fungicides were applied and the final reading was read only when refoliation was over and leaves were mature. The progress of refoliation was also visually estimated by differentiating the percentage of foliage of twenty trees per replicate into susceptible and resistant leaves.

Rainfall data for the trial periods concerned were extracted from meteorological records maintained by the estates. Rain that fell a few days before spraying commenced until about three days after the last spray was considered most important.

In the 1985 trial, the effect of fogging on latex yield was also investigated. Yield was recorded either by the cup-coagulation method (g per tree per tapping) or based on the estate task yields. For the first method, twice monthly, latex from two groups of twenty-five marked trees per replicate were acid coagulated in the tapping cups and the cuplumps were collected, air-dried for a month and weighed. Task yields were obtained by pooling the yields of the two replicates for each treatment.

TABLE 1 TREATMENTS OF FIELD TRIALS ON CHEMICAL CONTROL OF COLLETOTRICHUM SLF, 1982–5

Expt no	Site/leaf fall season	Location	Clone (date of planting)	Fungicide	Rate (kg/ha a i)	Plot size (ha × no of replicates)	Machine used
1	Site A, 1982	Batang Padang, lower Perak	RRIM 600 (1969)	Captafol	0 6	1 × 2	LECO 120B fogging machine (tractor mounted)
				Thiophanate methyl	0 5	1 × 2	LECO 120B fogging machine (tractor-mounted)
				Tricarbamates	0 3	1 × 2	LECO 120B fogging machine (tractor-mounted)
				Chlorothalonil	1 12	1 × 2	LECO 120B fogging machine (tractor-mounted)
				Control	—	1 × 2	LECO 120B fogging machine (tractor-mounted)
2	Site A, 1984	Batang Padang, lower Perak	RRIM 600 (1969)	Captafol	0 6	1 × 2	LECO 120D fogging machine (tractor mounted)
				Thiophanate methyl	1 0	1 × 2	LECO 120D fogging machine (tractor-mounted)
				Propiconazole	0 125	1 × 2	LECO 120D fogging machine (tractor mounted)
				Propiconazole	0 062	1 × 2	LECO 120D fogging machine (tractor-mounted)
				Penconazole	0 05	1 × 2	LECO 120D fogging machine (tractor-mounted)
				Control	—	1 × 2	LECO 120D fogging machine (tractor-mounted)
3	Site A, 1985	Batang Padang, lower Perak	RRIM 600 (1969)	Captafol	0 6	1 × 2	LECO 120D fogging machine (tractor-mounted)
				Captafol	0 6	1 × 2	Mini-micron mist-blower
				Penconazole	0 075	1 × 2	LECO 120D fogging machine
				Propiconazole	0 0125	1 × 2	LECO 120D fogging machine
				Propiconazole	0 1	1 × 2	LECO 120D fogging machine
				Prochloraz	0 085	1 × 2	Mini micron mist-blower
				Control	—	1 × 2	—

TABLE 1. TREATMENTS OF FIELD TRIALS ON CHEMICAL CONTROL OF COLLETOTRICHUM SLF, 1982–5 (CONTD)

Expt. no.	Site/leaf fall season	Location	Clone (date of planting)	Fungicide	Rate (kg/ha a.i.)	Plot size (ha × no. of replicates)	Machine used
4	Site B, 1983	Ulu Selangor	GT 1 (1973 and 1974)	Captafol	0.9	3 × 2	LECO 120D fogging machine (tractor-mounted)
				Captafol	0.6	3 × 2	Tifa Tiga fogging machine
				Chlorothalonil	1.12	3 × 2	Tifa Tiga fogging machine
				Control	—	3 × 2	Tifa Tiga fogging machine
5	Site B, 1984	Ulu Selangor	GT 1 (1973 and 1974)	Captafol	0.9	3 × 2	LECO 120D fogging machine (tractor-mounted)
				Captafol	0.6	3 × 2	LECO 120D fogging machine (tractor-mounted)
				Control	—	3 × 2	—
6	Site C, 1983	Ulu Selangor	GT 1 (1972)	Captafol	0.6	1 × 2	Tifa Tiga fogging machine
				Thiophanate methyl	0.5	1 × 2	Tifa Tiga fogging machine
				Chlorothalonil	1.12	1 × 2	Tifa Tiga fogging machine
				Propiconazole	0.125	1 × 2	Tifa Tiga fogging machine
				Control	—	1 × 2	—
7	Site D, 1984	Ulu Selangor	GT 1 on RRIM 600	Captafol	0.9	3 × 2	LECO 120D fogging machine (tractor-mounted)
				Captafol	0.6	3 × 2	LECO 120D fogging machine (tractor-mounted)
				Control	—	3 × 2	LECO 120D fogging machine (tractor-mounted)

RESULTS

Laboratory Trials

Captafol, prochloraz and chlorothalonil showed strong antifungal properties in the paper disc method of screening, followed by propiconazole, thiophanate methyl and anilazin. Penconazole and tricarbamate were less effective *(Table 2)*.

When the fungicides were incorporated into the growth medium, propiconazole, prochloraz and penconazole were most inhibitory, followed by thiophate methyl *(Table 3)*. Autoclaving affected the antifungal properties of captafol, tricarbamate and anilazin but not those of prochloraz, propiconazole and thiophanate methyl.

Leaves treated with fungicides had lower levels of infection than untreated leaves *(Table 4)*. Chlorothalonil, captafol and propiconazole were most effective in reducing infection while penconazole was effective only at higher concentrations. Thiophanate methyl, anilazin, tricarbamate and prochloraz were not effective at the tested concentrations.

Field Trials

Effect on leaf fall, severity of infection and canopy density. Generally, there was less leaf fall in the treated plots than in the control in all trials *(Figures 1–5)*. However, significant reductions were only achieved in trials conducted at *Site A* in 1985 *(Figure 5)*, *Site B* in 1984 *(Figure 4B)*, *Site C* in 1983 *(Figure 2)* and *Site D* in 1984 *(Figure 4A)*.

Similarly, leaves sampled from trees of treated plots were significantly less severely infected than those from the control plots *(Table 5)*. There were also gains in canopy density although increases varied from marginal (<10% increase over control) to substantial (>20% over control) *(Table 5)*.

Comparison of fungicides and doses. Captafol was the most frequently tested. It performed well in most trials but fared poorly in the 1984 trial at *Site A (Figure 3)*. The poor results obtained was attributed to poor fungicide coverage. The tractor-mounted fogging machine was unable to gain access to the soft ground of the treatment plot.

The better performance of captafol over most of the other fungicides tested was demonstrated in the trials at *Site C* set up in 1983 *(Figure 2)* and at *Site A* in 1982 and 1985 *(Figures 1* and *5* respectively). In these trials, captafol-treated plots, irrespective of whether the fungicide was fogged or sprayed, had improved canopies with an increase of more than 20% over control *(Table 5)*.

Of the remaining fungicides, only propiconazole, penconazole and prochloraz showed promise. Propiconazole applied at 125 g per

TABLE 2. EFFECT OF FUNGICIDES ON THE DEVELOPMENT OF *C. GLOEOSPORIOIDES* ON PAPER DISCS

Fungicide (trade name)	Concentration causing total inhibition (mg/litre)	
	48 h	96 h
Chlorothalonil (Daconil 2787, 50WP)	15.63	31.25
Captafol (Difolatan, Haipen 80WP)	3.91	15.63
Thiophanate methyl (Topsin M 50WP)	62.50	62.50
Propiconazole (Tilt, 25EC)	31.25	62.50
Anilazin (Dyrene, 50WP)	62.50	62.50
Tricarbamates (Tricarbamix 70WP)	125.00	500.00
Prochloraz (Sportak, 45 EC)	3.91	7.81
Penconazole (Topas, 10EC)	125.00	250.00

TABLE 3. INHIBITION OF RADIAL GROWTH OF *C. GLOEOSPORIOIDES* BY FUNGICIDES

Fungicide[a]	Inhibition[b] of radial growth (%)				
	15.63 mg/litre a.i.	31.25 mg/litre a.i.	62.50 mg/litre a.i.	125.00 mg/litre a.i.	250.00 mg/litre a.i.
A. Before autoclaving					
Chlorothalonil	54.16	56.36	57.14	57.77	59.97
Captafol	6.91	9.26	11.46	17.43	21.35
Thiophanate methyl	64.52	64.21	68.76	72.21	72.84
Propiconazole	100.00	100.00	100.00	100.00	100.00
Anilazin	10.52	13.97	15.86	28.89	41.60
Tricarbamates	10.20	7.06	10.04	6.59	11.30
Prochloraz	100.00	100.00	100.00	100.00	100.00
B. After autoclaving					
Chlorothalonil	16.00	20.79	26.40	33.47	48.65
Captafol	82.95	86.90	87.11	86.49	87.11
Thiophanate methyl	68.40	70.48	76.09	80.25	87.11
Propiconazole	100.00	100.00	100.00	100.00	100.00
Anilazin	68.82	80.46	86.49	88.77	88.57
Tricarbamates	4.57	7.90	12.47	24.74	64.66
Prochloraz	100.00	100.00	100.00	100.00	100.00
Penconazole	100.00	100.00	100.00	100.00	100.00

Analysis of variance indicated no significant differences between concentrations, however the differences between fungicide treatments are significant (p = 0.01) for both *A* and *B*.

[a] For trade names, see *Table 2*

[b] Percentage inhibition $= \frac{\text{Diameter in control} - \text{diameter in treated}}{\text{Diameter in control}} \times 100$

hectare a.i. recorded substantial increases in canopy density in two out of the three trials it was included *(Table 5)*. Since lower rates of propiconazole resulted in poorer control *(Figure 3)*, it may therefore be assumed that concentrations of below 125 g per hectare propiconazole would not be effective in controlling the disease and in boosting the canopies. Penconazole, on the other hand, when tested at very low concentrations of 50 g per hectare a.i. performed better than thiophanate methyl *(Figure 3)*, and at higher concentrations of 75 g per hectare resulted in better canopy than propiconazole *(Table 5, Figure 5)*. Prochloraz also performed creditably in the 1985 trial *(Figure 5)*. Further testing is required to determine its effectiveness and optimum dosage.

The trials set up at *Site B* in 1983 and 1984 and at *Site D* in 1984, to specifically compare the effectiveness of two dosages of captafol, showed that increasing the concentration of the fungicide from 600 g to 900 g per hectare a.i. did not result in better leaf disease control and canopy density *(Table 5, Figure 4B)*. However, better results were obtained in the 1984 trial at *Site D*, where the plot treated with the higher dosage of the chemical had an increase of 16%

TABLE 4. EFFECT OF FUNGICIDES ON INFECTION OF *HEVEA* LEAVES BY *C. GLOEOSPORIOIDES*

Fungicide	Relative control (%)[a]					
	31.25 mg/litre		62.50 mg/litre		125.00 mg/litre	
	48 h	72 h	48 h	72 h	48 h	72 h
Chlorothalonil	87.14	76.77	81.43	60.61	81.43	69.70
Captafol	87.14	70.70	92.86	76.77	97.14	82.82
Thiophanate methyl	17.14	5.02	29.90	7.07	41.42	22.22
Propiconazole	86.67	81.42	83.33	87.14	76.67	82.86
Anilazin	39.00	33.00	71.00	56.00	77.00	53.00
Tricarbamates	9.30	0.00	8.20	2.00	15.50	2.00
Prochloraz	18.18	0.00	16.16	0.00	27.27	4.29
Penconazole	66.67	50.00	93.33	80.00	96.67	94.29

Analysis of variance indicated that differences in the means of concentrations were significant at 5% level and between fungicide treatment at 1%.

[a] Relative control (percentage reduction in the number of lesions) = $\frac{\text{No. of lesions on control} - \text{no. of lesions on treated}}{\text{No. of lesions on control}} \times 100$

in canopy *(Figure 4A)*. Rainfall was heavier at *Site D* (≃ 190 mm) than *Site B* (≃ 71 mm) in 1984, which could have affected the results. Rainfall in general was more frequent and heavier in 1984 than in 1983. A comparison of the performance of wettable powders such as captafol, chlorothalonil and thiophanate methyl showed that they gave better disease control in 1983 than in 1984. On the other hand the effectiveness of the oil-soluble systemic fungicides propiconazole and penconazole was relatively consistent in both years.

Effect of Chemical Control on Yield

Only the 1985 yield record was available. A non-significant increase of 1%–11.3% in task yields over control was recorded over a period of eleven months with the various fungicides *(Figure 6)*. The highest yield increase of approximately 311 kg per hectare was recorded in the plot sprayed with captafol, followed in descending order by penconazole (304 kg per hectare), propiconazole 125 g per hectare a.i. (242 kg per hectare), captafol-fogged (233 kg per hectare), prochloraz (125 kg per hectare) and propiconazole 100 g per hectare a.i. (29 kg per hectare). Yield increases based on the cup-coagulation method were lower than those based on task yields, the highest gain recorded being only 7.5%. When the yield data from the cup-coagulation method was computed taking the pre-treatment yield records for two months into consideration, the results again showed non-significant differences between chemical treatments and control.

DISCUSSION

Several fungicides were found to be effective against *C. gloeosporioides* in laboratory screening tests. Captafol, chlorothalonil, propiconazole and penconazole were good protectants against infection by the fungus as they reduced infection of treated leaves *(Table 4)*. Propiconazole and penconazole are potentially more potent chemicals since they are effective at low dosages and being oil-soluble systemics, are more suitable for fogging.

Fogging as a method of applying fungicides gave good control of Oidium SLF of rubber[12]. Present results indicate that fogging can also

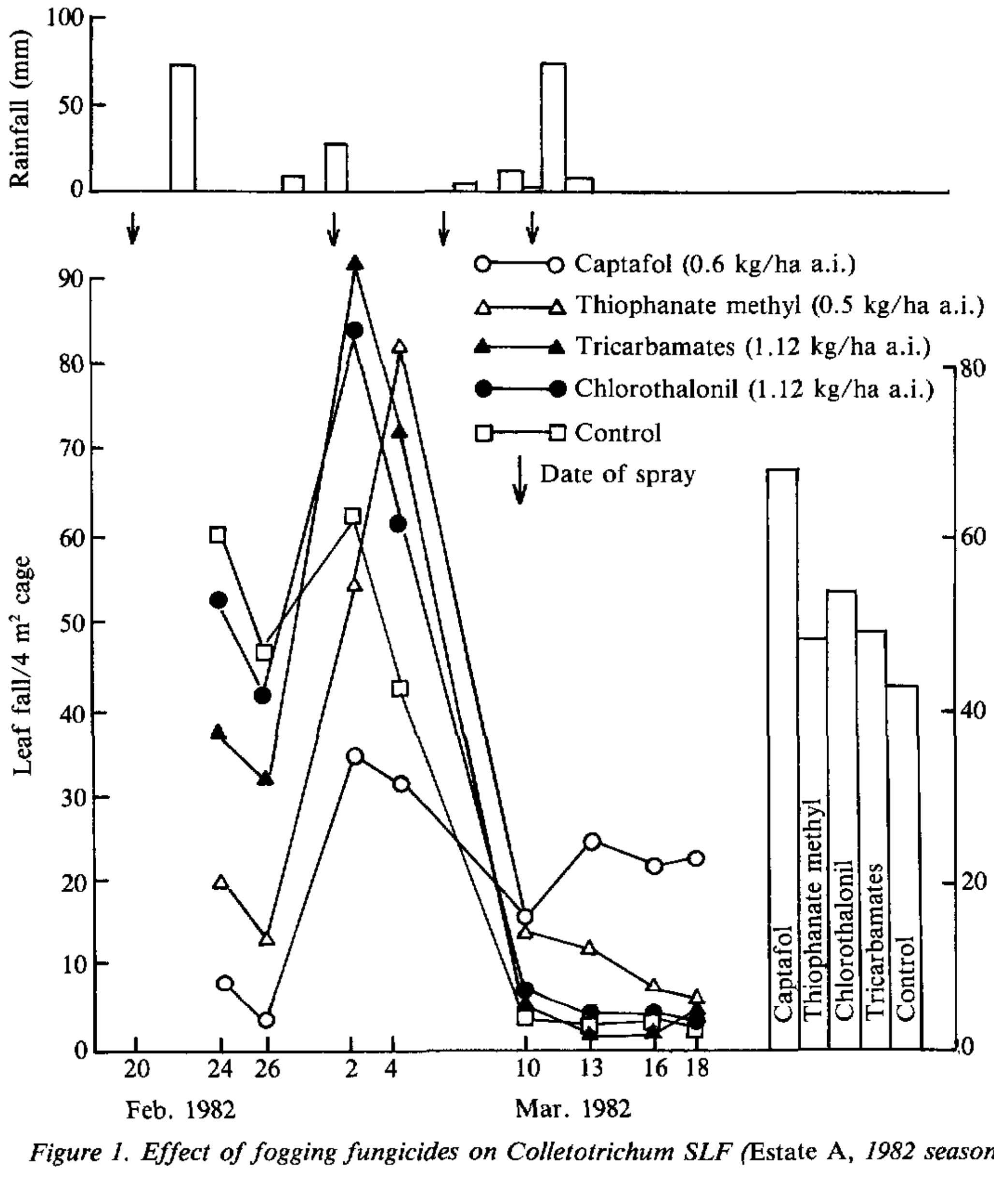

*Figure 1. Effect of fogging fungicides on Colletotrichum SLF (*Estate A, *1982 season).*

be an effective method of controlling Colletotrichum SLF of mature rubber if suitable fungicides are used. The success of fogging, however, is dependent and influenced by several factors, rainfall being one of them. Heavier and more frequent rainfall would not only increase disease inoculum, hence the severity of the attack, but also increase chemical wash-outs. It may be necessary therefore to use higher concentrations of fungicides to effect a good control. This was demonstrated by captafol which gave better control at higher dosage under such conditions *(Figure 4A)*. There was no advantage to be gained from higher dosage

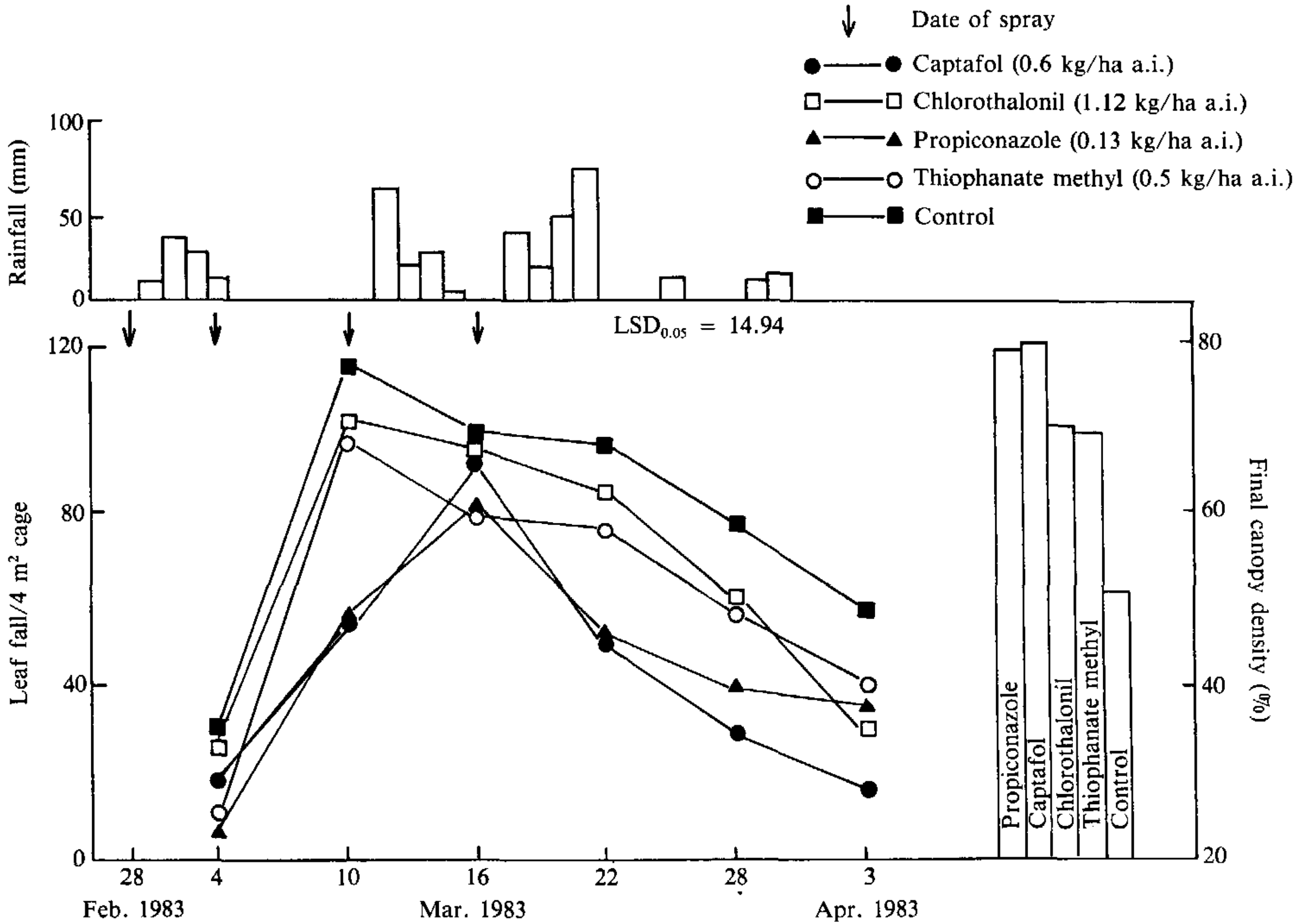

*Figure 2. Effect of fogging fungicides on Colletotrichum SLF (*Estate C, *1983 season).*

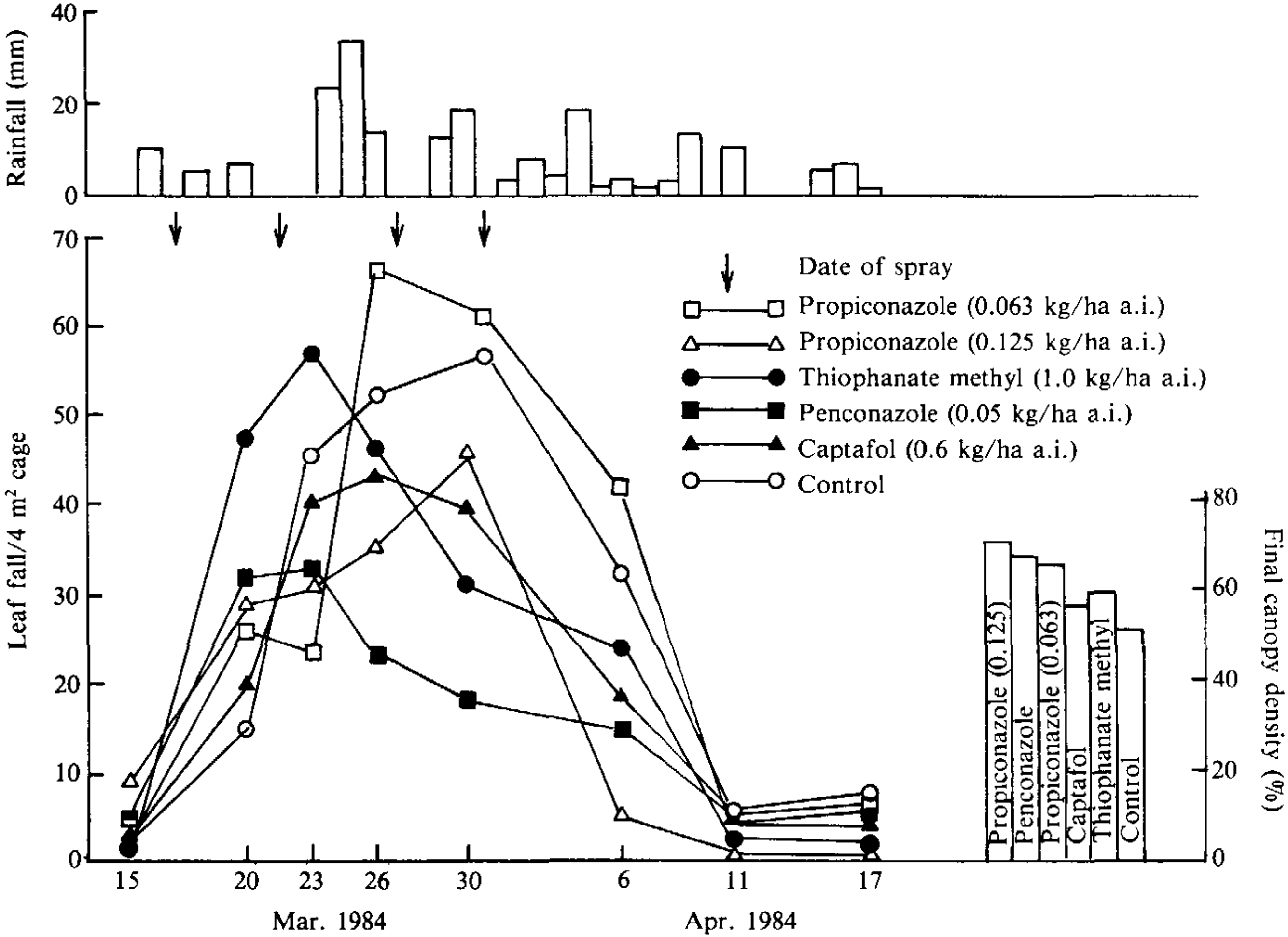

*Figure 3. Effect of fogging fungicides on Colletotrichum SLF (*Estate A, *1984 season).*

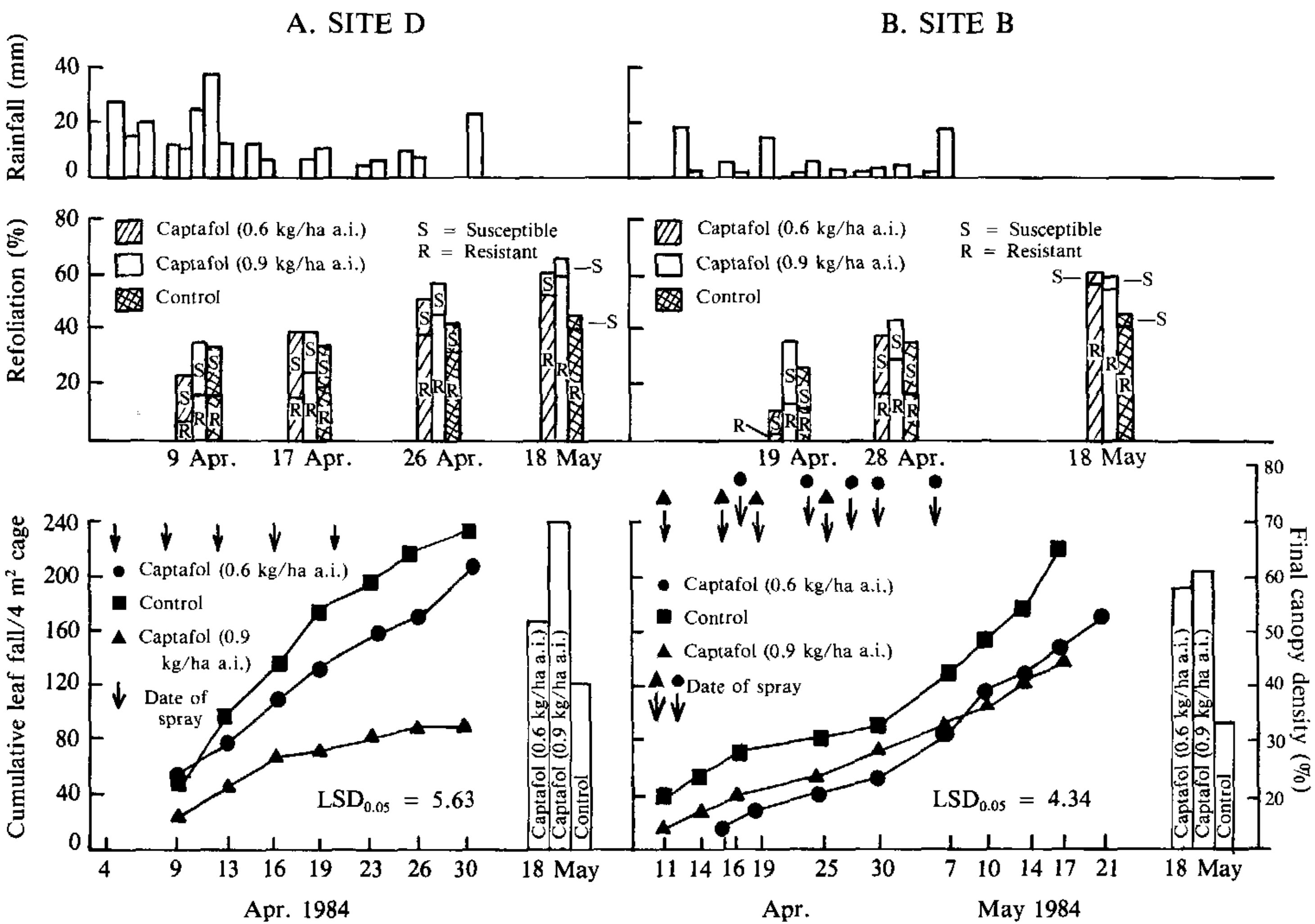

Figure 4. Effect of fogging captafol on Colletotrichum SLF.

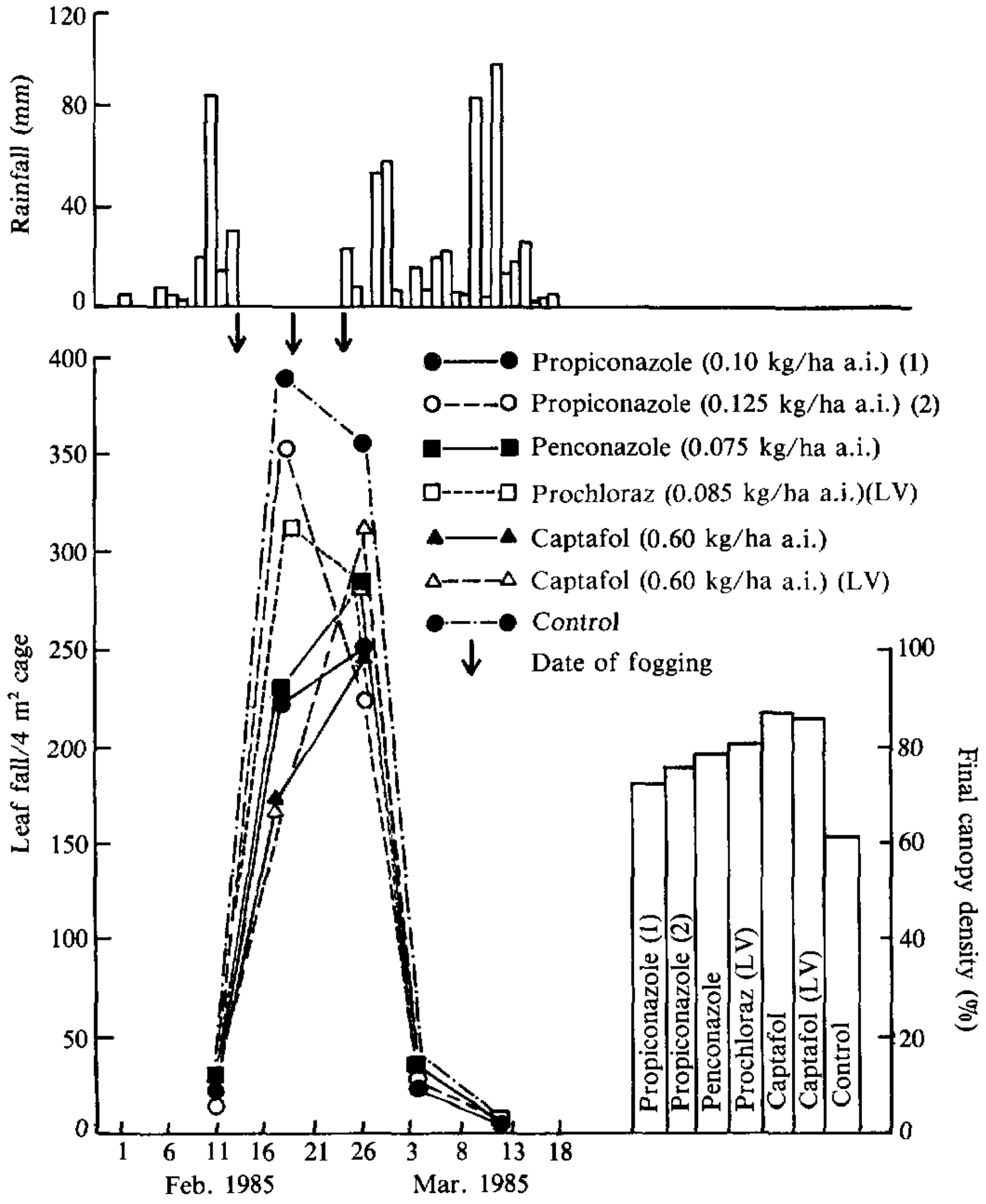

*Figure 5. Effect of fogging fungicides against Colletotrichum SLF (*Estate A, 1985 season).

when rainfall was low. The performance of oil-soluble chemicals such as penconazole and propiconazole would be less affected by rainfall.

Disease control was also affected by the uniformity of refoliations and the number and regularity of spraying. Better disease control was achieved when refoliation was rapid and

TABLE 5 EFFECT OF FUNGICIDES ON THE INFECTION OF LEAVES BY *C GLOEOSPORIOIDES* AND FINAL CANOPY DENSITY OF TREES

Expt no	Site/leaf fall season	Treatment (kg/ha a i)	Infection scores[a] (mean from 5 assessments)	Final canopy density (%)	Increase in canopy density of treated plots over control (%)
1	Site A, 1982	Control	2 44[b]	43 2	—
		Tricarbamates (0 3)	1 86	48 8	5 6
		Chlorothalonil (1 12)	1 82	54 0	10 8
		Thiophanate methyl (0 3)	0 74	47 8	4 6
		Captafol (0 6)	1 00	66 3	23 1
2	Site A, 1984	Control	2 52	50 8	—
		Thiophanate methyl (1 0)	2 04	59 8	9 0
		Captafol (0 6)	1 90	56 2	5 4
		Penconazole (0 05)	1 90	67 5	16 7
		Propiconazole (0 125)	1 56	70 8	20 0
		Propiconazole (0 062)	1 46	61 7	10 9
3	Site A, 1985	Control	2 5	62 5	—
		Propiconazole (0 125)	2 1	75 3	12 8
		Propiconazole (0 1)	1 94	72 8	10 3
		Prochloraz	1 88	80 0	17.5
		Penconazole (0 075)	1 84	78 8	16 3
		Captafol LV (0.6)	1 60	85 5	23 0
		Captafol (0 6)	1 52	86 8	24 3
4	Site B, 1983	Control	2 14	63 2	—
		Chlorothalonil (1 12)	1 26	70 0	6 8
		Captafol (0 9)	1 20	74 3	11 1
		Captafol (0 6)	0 88	73 5	10 3
5	Site B, 1984	Control	3 22	55 3	—
		Captafol (0 9)	2 24	73 4	18 1
		Captafol (0 6)	1 90	70 1	14 8
6	Site C, 1983	Control	2 54	52 5	—
		Chlorothalonil (1 12)	2 26	64 5	12 0
		Thiophanate methyl (0 5)	1 84	61 3	8 8
		Captafol (0 6)	1 66	79 2	26 7
		Propiconazole (0 125)	1 62	78 5	26 0
7	Site D, 1984	Control	2 4	50 3	—
		Captafol (0 9)	1 64	78 1	27 8
		Captafol (0 6)	1 64	60 1	9 8

[a] The intensity of infection on leaves is scored as follows 1 = very light, 2 = light, 3 = moderate, 4 = severe

[b] Means enclosed within a bracket are not significantly different at the 5% level by Duncan's Multiple Range Test

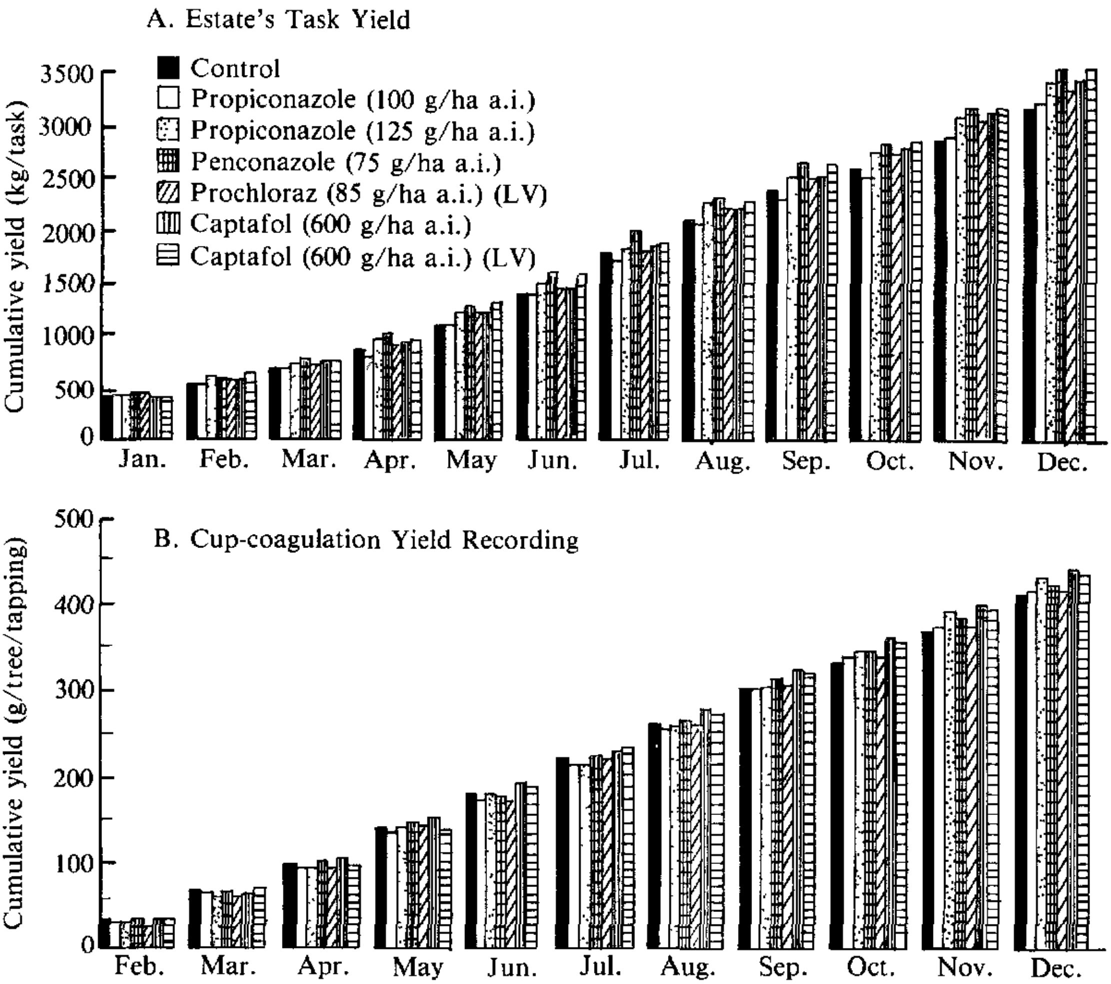

Figure 6. Effect of chemical treatment on latex yield in Site A, *1985.*

uniform *(Figures 2* and *5).* As demonstrated, even three rounds of treatment were sufficient to effect a good canopy retention. However, when refoliation was prolonged and staggered, five or more rounds were required. Shorter spray intervals of every four days gave better control than long and irregular ones such as indicated in *Figure 1.* This is consistent with the fact that *C. gloeosporioides* is a fungus that has a very short life-cycle and spraying should be timed to break this cycle.

Results thus far showed that 0.6 kg per hectare a.i. captafol was promising for the control of Colletotrichum SLF, except during heavier and more frequent rainfall, when a higher dosage of 0.9 kg per hectare a.i. proved to be more effective. The oil-soluble systemic fungicides propiconazole (125 g per hectare) and penconazole (75 g per hectare) also gave good control of Colletotrichum SLF.

Notwithstanding the other benefits of controlling SLF such as improvements in bark renewal and girth increment as well as reduction in weeding[16], an increase in latex yield is the ultimate aim of chemical disease control. In Malaysia, increases of latex yield following fungicide treatment of SLF had been inconsistent[1,2,16,17]. The increase in yield recorded in one of the trials for 1985 presented here ranged from 1% to 11% over control, the higher percentage was the result of more than 20% improvement in canopy density *(Table 5)*. The increase, however, was statistically insignificant. This might imply that a much better improvement in canopy is needed for significant yield increases. However, it is noteworthy that in this trial *(Site A)*, the control plot already had a canopy of more than 60%. A better yield increase may be obtained following treatment of traditionally severely affected areas where the canopy can be about 40% or less. In addition, the economics of treatments for at least three consecutive seasons should be investigated. Following five consecutive seasons of artificial defoliation as a means of disease escape, a yield increase of 33% was obtained[2]. It cannot be said for sure whether the same will be true for fungicide fogging to control Colletotrichum SLF. However, the indication is, as was shown in the latest trial *(Table 5)*, that following three seasons of fungicide treatment at *Site A*, the canopy could be boosted from the low 40% in the first season to more than 85% after the third season.

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