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INCIDENCE AND SEVERITY OF CORYNESPORA LEAF FALL (CLF) DISEASE OF RUBBER IN COASTAL KARNATAKA AND NORTH MALABAR REGION OF KERALA

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Widespread incidence of Corynespora leaf fall (CLF) disease in mature rubber plantations was reported in 1996 from Nettana in South Karnataka, India. Surveys carried out in coastal Karnataka and North Malabar region of Kerala during 1998-2000 disease seasons indicated that the disease incidence and severity of infection varied between light to severe in all the locations. The intensity of infection was found to increase gradually and the incidence to widen year after year. Subramanya region in Karnataka exhibited maximum intensity of the disease. Fresh incidence was noticed in Hosdurg and Nileshwar in Kerala during 2000. Variation in intensity of disease among different clones was observed with the clone RRII 105 showing high and RRIM 600 and GT 1 showing low infection in all the locations surveyed.

Key words : *Corynespora cassiicola, Hevea brasiliensis*, India, Leaf disease.

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INTRODUCTION

Corynespora leaf fall (CLF) disease, incited by *Corynespora cassiicola* (Berk. and Curt.) Wei has emerged as a major disease of rubber (*Hevea brasiliensis*) in South East Asia. The disease is reported to be more prominent and widely distributed since 1975 in Malaysia (Kamar, 1994). In Indonesia, it was first reported in 1980 in North Sumatra, and caused heavy economic loss (Sinulingga *et al.*, 1996). Severe outbreak of this disease was reported in Sri Lanka during 1985, which subsequently led to an epidemic (Liyanage *et al.*, 1991). In India, mild incidence of the disease was reported in mature plantations in 1969 and 1976 (George and Edathil, 1980). During 1996, the disease appeared in more damaging dimensions at Hevea Breeding Sub-Station of the Rubber Research Institute of India at Nettana in Dakshina Kannada District of Karnataka State (RRII, 1997). Thereafter, it spread rapidly to adjacent coastal Karnataka and northern Kerala.

Considering the potential damage due to CLF disease, the present study was undertaken to assess the intensity and spread of the disease by conducting survey in coastal region of Karnataka and adjoining North Malabar region of Kerala.

MATERIALS AND METHODS

The survey was carried out in six locations in coastal region of Karnataka spread over three districts, Dakshina Kannada, Udupi and Coorg and three locations in Kasaragod district of North

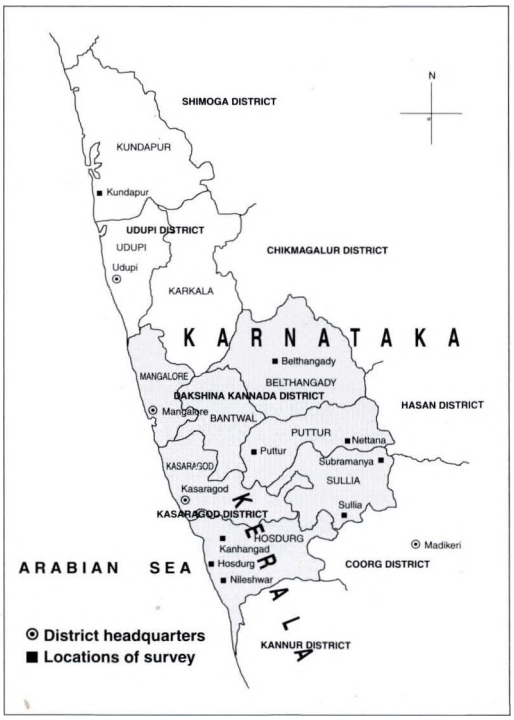

Fig. 1. Map showing locations surveyed in coastal areas of Karnataka and North Malabar region of Kerala.

Malabar region in Kerala (Fig. 1). Survey was conducted during 1998-2000 disease seasons. The plantation units, distributed over the selected locations were visited for disease assessment during peak disease period (March-May). A total of 171 units in 1998, 158 units in 1999 and 191 units in 2000 disease seasons were visited for this purpose. For each selected unit, disease assessment was made for 25 plants of each available clone. The severity of the disease was assessed on a 0-5 scale based on intensity of spotting, lesions and leaf fall. The scale used was, 0=No disease, 1=Very light (up to 5 spots), 2=Light (5-10 spots and 10-25% leaf fall), 3=Moderate (>10 spots and 26-50% leaf fall), 4=Severe (large lesions and 51-75% leaf fall), 5=Very severe (large lesions and >76% leaf fall). Percentage disease intensity was calculated using the formula of McKinney (1923).

RESULTS AND DISCUSSION

The CLF disease was detected in large estates as well as in smallholdings in all the locations surveyed. The extent of incidence in surveyed units is given in Table 1. A total of 97 units (56.73%) recorded presence of disease out of 171 during 1998 season, 133 out of 158 units (84.18%) in 1999 season and 164 out of 191 units (85.86%) surveyed during 2000 season showing spread of the disease over the years. Maximum disease occurrence was recorded at Subramanya during all the surveyed seasons. The minimum disease incidence was recorded in Belthangady during 1998 and in Kundapur during 1999 and 2000. The Hevea Breeding Sub-Station of Rubber Research Institute of India is located at Subramanya region, where the disease was initially noticed in damaging proportion.

Average disease intensity recorded in different locations is presented in Table 2. The results indicated significant differences

Table 1. **Occurrence of Corynespora leaf fall disease during 1998-2000**

Location	1998		1999		2000		Average infected units (%)
	No. of units		No. of units		No. of units		
	Surveyed	% infected	Surveyed	% infected	Surveyed	% infected	
Karnataka							
Kundapur	15	46.67	15	46.67	21	52.38	48.57
Belthangady	26	26.92	22	54.54	16	62.50	47.99
Puttur	39	51.28	25	100.00	30	100.00	83.76
Sullia	44	59.09	25	100.00	20	100.00	86.36
Madikeri	12	66.60	11	81.82	11	100.00	82.81
Subramanya	15	100.00	20	100.00	25	100.00	100.00
Kerala							
Kanhangad	20	70.00	40	87.75	42	92.86	83.54
Nileshwar	-	-	-	-	12	66.67	66.67
Hosdurg	-	-	-	-	14	71.43	71.43

Table 2. **Intensity of Corynespora leaf fall disease**

Location	Disease intensity (%)		
	1998	1999	2000
Karnataka			
Kundapur	26.42 (30.00) bc	31.14 (33.30) b	17.45 (23.96) d
Belthangady	24.85 (29.17) c	29.83 (32.51) c	15.82 (22.98) d
Puttur	36.00 (36.26) bc	58.56 (50.32) a	32.87 (34.07) abc
Sullia	40.46 (38.82) abc	58.96 (51.44) a	34.20 (34.93) abc
Madikeri	32.50 (33.94) bc	53.11 (47.04) ab	31.64 (33.04) a-d
Subramanya	52.26 (46.57) a	66.00 (56.12) a	36.56 (36.47) ab
Kerala			
Kanhangad	45.42 (42.12) ab	61.35 (52.13) a	38.80 (37.76) a
Nileshwar	-	-	18.00 (24.44) cd
Hosdurg	-	-	23.80 (27.95) bcd
CV (%)	35.21	32.04	39.40

Figures in parentheses indicate arc sine transformed average values
Location means having same letters under each season are not significantly different by L.S.D. test at P≤0.05

among the locations. In coastal Karnataka, low disease intensity was noticed in Belthangady and Kundapur for all the three years while it was high at Subramanya, Sullia and Puttur, where rubber plantations of coastal Karnataka region are concentrated. In Madikeri, though the area under rubber is less, the disease intensity was high during 1999 and 2000 seasons. In North Malabar region of Kerala, Kanhangad recorded the higher disease intensity in all the three seasons. In 2000, there was a considerable reduction in the intensity of the disease in all the locations. Moreover, repeated defoliation observed during previous seasons was not seen during this period. This could be due to the reduction in inoculum load in the field, achieved by the extensive spraying of fungicide carried out by the Rubber Board in these locations during 1999 season, under CLF disease management programme.

Regional variation in the CLF disease intensity has been reported from other rubber growing countries. Conducive weather condition during refoliation period, inferior quality of planting materials, improper use of agricultural inputs and poor maintenance of plantation contribute to differences in disease intensity among locations (Kamar and Hidir, 1996).

The distribution of disease severity among the units surveyed from different locations is depicted in Figure 2. Frequency of disease-free units and units with lower intensity was more during 1998 season while it decreased in many locations during subsequent years. The 1999 disease survey showed an increase in the severity of the infection and more than 50 per cent of the units were very severely infected. However, in 2000 season the frequency of units showing severe to very severe infection was conspicuously lower in all the locations.

During all the three seasons, disease intensity ranged between very low to very severe in Subramanya, Sullia and Kanhangad, while in Puttur and Madikeri, similar situation was observed only during 1999 and 2000. The intensity remained moderate in Kundapur and Belthangady. In Nileshwar and Hosdurg of North Malabar the disease was very light to moderate/severe during 2000 season. These locations were not surveyed during previous years as there was no report of disease occurrence. Severity of CLF disease in the units was intensified mainly by the existence of susceptible clone, poor soil fertility and inadequate nutrient supply (Rao, 1975). The pathogen thrives very well in an environment where light is available with optimum temperature of 28-30°C. Water stress during refoliation period

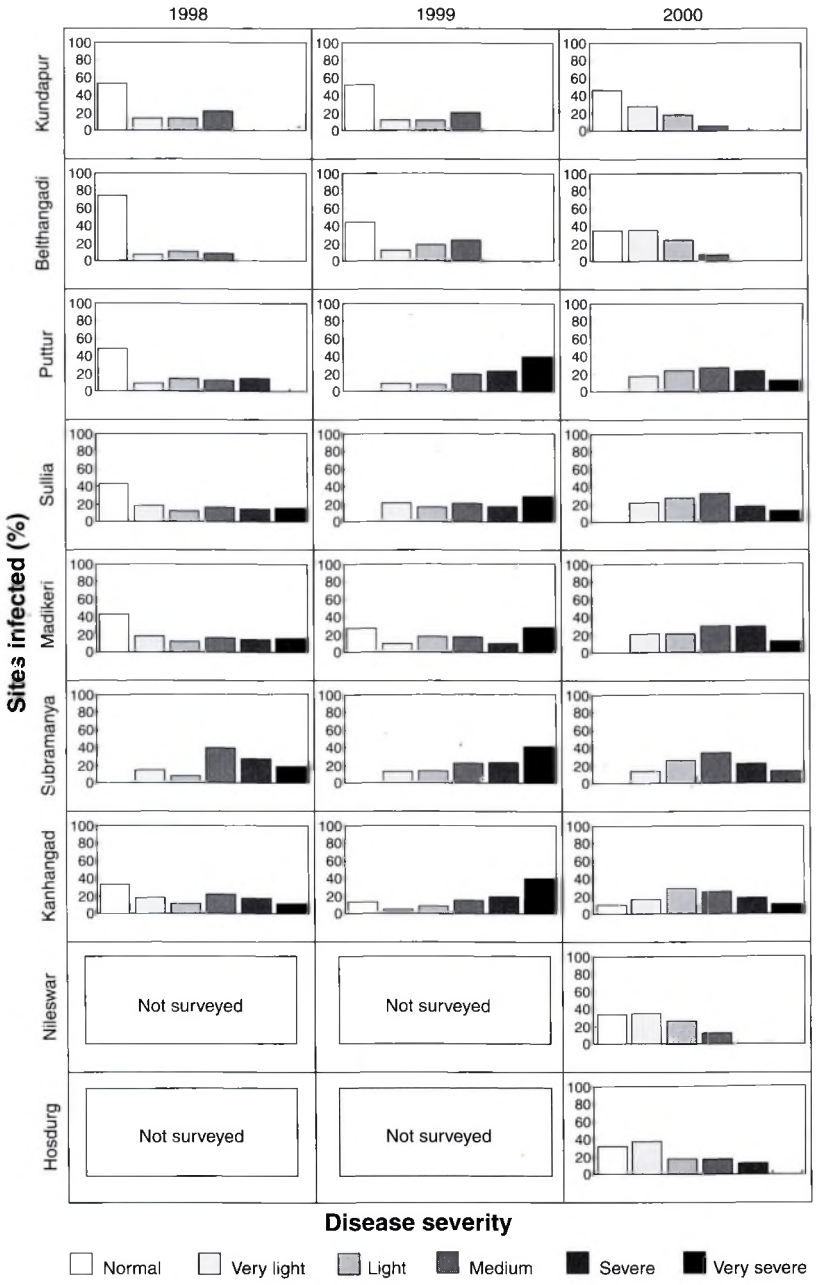

Fig. 2. Distribution of desease severity in nine locations surveyed for three seasons.

favours the infection rate (Chee, 1988). Changes in conducive factors could have influenced the disease in field, thus contributing to the variation in severity of disease observed in the units surveyed.

Intensity of CLF disease incidence in various clones planted in the surveyed locations is presented in Table 3. Disease was

Table 3. **Clonewise disease intensity score in different locations**

Clone	Location								
	KPR	BTD	PTR	SLA	SBM	MDK	KGD	NLS	HSD
RRII 105	2.81a	2.30 a	3.20 a	3.15 a	3.37 a	3.06 a	3.29 a	2.50 a	2.80 a
PB 260	1.40 bc	1.22 b	1.80 b	1.68b	2.20 b	2.17 b	2.21 b	1.85 b	1.90 b
GT 1	0.50 d	0.47 d	0.67 c	0.82 c	0.86 c	0.65 c	0.75 e	0.97 d	0.80 c
RRIM 600	0.80 cd	0.78 c	1.00 c	0.84 c	1.17 c	0.97 c	1.27 d	1.07 d	0.85 bc
PB 217	1.47 b	1.23 b	1.79 b	1.57 b	2.12 b	2.13 b	2.22 bc	1.57 c	-
PB 235	-	-	-	-	2.07 b	2.00 b	2.04 c	-	-

KPR – Kundapur; BTD – Belthangady; PTR – Puttur; SLA – Sullia; SBM – Subramanya; MDK – Madikeri; KGD – Kanhangad; NLS – Nileshwar; HSD – Hosdurg

Clone means having same letters under each location are not significantly different by LSD test at P≤0.05.

Score						
	0	No disease	1.01 – 2.00	Light	3.01 – 4.00	Severe
	0.01 – 1.00	Very light	2.01 – 3.00	Moderate	4.01 – 5.00	Very severe

observed in all the clones with varying intensity. The popular clone RRII 105 occupied majority of the area and was found severely infected by the disease, while the clones PB 217, PB 235 and PB 260 showed moderate infection. Kamar and Hidir (1996) had reported that GT 1, PB 217, PB 235 and PB 260 were moderately infected while RRIM 600 was severely infected in all the rubber growing states of Malaysia. In contrast to this, in the present study RRIM 600 and GT 1 recorded very low infection in all the locations. Susceptibility of RRIM 600, RRIC 105, and Tjir 1 had also been reported from Sri Lanka (Jayasinghe and Silva, 1996). The clones RRIM 600 and GT 1, which were formerly categorized as moderately resistant in Indonesia, have now been reported to be severely infected (Sinulingga *et al.*, 1996).

The present survey shows that CLF disease is distributed throughout the rubber growing areas in the coastal Karnataka and some parts of Malabar region of Kerala. The intensity of the disease varied with location and clone. The data generated can form the basis for disease mapping and disease management.

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