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INCIDENCE AND SEVERITY OF *GLOEOSPORIUM* LEAF DISEASE OF RUBBER IN SOUTH INDIA

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A survey on *Gloeosporium* leaf disease of rubber was conducted in South India to monitor the distribution of the disease and its severity. Eight representative rubber growing regions were selected and 95 sites surveyed. The results indicated that the disease incidence and severity of infection were moderate to very severe in all the regions, except in Kulasekharam where the disease was mild. The clones RRII 105, GT 1 and PR 225 were more susceptible compared to the other clones covered under the survey.

Key words : Disease survey, *Gloeosporium*, *Hevea*, Leaf disease, South India.

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INTRODUCTION

Hevea brasiliensis (Willd. ex Adr. de Juss.) Muell. Arg. is susceptible to several leaf diseases. Among them, *Gloeosporium* leaf disease caused by the fungus *Gloeosporium alborubrum* Petch., the imperfect stage of *Glomerella cingulata* (Carpenter and Stevenson, 1954), occurs during the rainy season on nursery and immature plants. The pathogen, synonymous with *Colletotrichum gloeosporioides* (Penz.) Sacc. causes extensive damage to tender leaves. The infection results in the appearance of blackish-brown spots surrounded by a yellow halo. The very young brownish leaves shrivel and defoliation follows. On immature green leaves numerous raised spots with holes in the centre are prominent (Ramakrishnan and Pillai, 1961). Severe attack of the fungus results in growth retardation and thereby prolongation of the immaturity period of rubber trees. Reduction in crop production ranging from 7 to 45 per cent has been reported from Indonesia and 12 per cent from Sri Lanka (RRDB, 1994) due to incidence of this disease.

In India, the disease was confined to a few localities but has recently gained more importance with its spread to all the traditional rubber growing areas. The incidence of the disease has also been reported from non-traditional rubber growing belts of the north-eastern region, during the rainy season (Deka *et al.*, 1996; Singh *et al.*, 1998). Considering the damage caused by the disease, an assessment of the incidence of

the disease among clones in different locations, was made in the traditional rubber growing regions of South India.

MATERIALS AND METHODS

A disease survey on *Gloeosporium* leaf disease was conducted during the peak disease season (September-October) in 1996, in six areas in Kerala and one each in Tamil Nadu (Kulasekharam, Kanyakumari district) and Karnataka (Mangalore, Dakshina Kannada district) states in South India (Table 1) representing the traditional rubber belt. The survey covered 11 popular clones. A total of 95 sites were included in the survey. For each selected site, assessment of the disease was made from 125 plants for each clone. All the clones, however, were not available in all the areas. Observations were recorded from leaves of comparable growth stage throughout the survey. The severity of the disease was assessed on a 0-5 scale based on intensity of spotting, leaf deformation and leaf fall, where 0 = no disease (Nil); 1 = 1 to 10 per cent leaf area infected (very light); 2 = 11 to 20 per cent leaf area infected (light); 3 = 21 to 40 per cent leaf area infected (moderate); 4 = 41 to 70 per cent leaf area infected (severe) and 5 = >70 per cent leaf area infected or leaves fallen (very severe). The per cent disease incidence (McKinney, 1923) was calculated.

RESULTS AND DISCUSSION

The disease was prevalent on young rubber plants in all the sites surveyed. The incidence of the disease in different areas in South India is presented in Table 1. The data indicate significant variation in the disease incidence from region to region.

The lowest disease incidence was noticed in Kulasekharam region (29.17%). The maximum occurrence of the disease was registered in Thodupuzha (83.12%) followed by Ranni (77.25%), Mundakayam (73.20%) and Trichur (71.29%). Mangalore, Calicut and Punalur areas recorded 60.33 to 67.25 per cent disease incidence. The variation in the disease incidence among the regions indicates the probable influence of weather conditions, particularly the intensity and distribution of rainfall (Table 2) enjoyed by each. *Gloeosporium* leaf disease was observed to be severe in regions which received high and well-distributed

Table 1. **Incidence of *Gloeosporium* leaf disease in South India**

Region	No. of sites surveyed	Disease incidence (%)	SE
Kulasekharam	12	29.17(32.61)	1.80
Punalur	12	67.25(55.20)	1.80
Ranni	8	77.25(61.65)	2.21
Mundakayam	10	73.20(59.74)	1.97
Thodupuzha	16	83.12(66.25)	1.56
Trichur	14	71.29(58.10)	1.67
Calicut	14	63.07(52.82)	1.67
Mangalore	9	60.33(50.98)	2.08
Mean		65.91(54.91)	

Figures in parentheses are arc sine transformed values

Table 2. **Rainfall during 1996 in the surveyed areas**

Region	Total rainfall (mm)	No. of rainy days
Kulasekharam	1860	130
Punalur	2622	140
Ranni	2979	186
Mundakayam	3773	150
Thodupuzha	4375	160
Trichur	2840	131
Calicut	2805	132
Mangalore	4586	144

rainfall during the monsoon season. In Malaysia also the disease incidence varied from region to region (24-100%) in traditional rubber growing states (Kamar, 1994).

The severity of the disease recorded from the sites surveyed is furnished in Table 3. The disease was observed in all the sites and the severity of infection generally ranged from moderate to very severe, except for Kulasekharam region where the disease incidence was mild.

Among the high disease prone regions, Thodupuzha showed very severe infection in 40 per cent of the sites followed by Ranni (37%), Mundakayam (31%), Punalur (24%), Trichur (27%) and Calicut and Mangalore (20%). But in Kulasekharam region 75 per cent of the sites registered very light infection and 25 per cent showed only light infection. Rainfall, daily temperature and high relative humidity influence the growth of the pathogen and its spore germination. The pathogen thrives very well in an alternate dark and light environment, optimal temperature being 29°C with RH of 96 per cent or higher. Existence of free water on leaf surface favours the infection (IRRI, 1994). The disease severity in the field may be influenced by a combination of the environmental factors at each location. This may have contributed much in the variation in severity of disease in the sites surveyed.

The susceptibility of *Hevea* clones to *Gloeosporium* leaf disease in each of the surveyed regions is presented in Table 4. The disease was observed in all the clones surveyed, although at varying intensity. The most popular high yielding clone RRII 105, which covers more than 80 per cent of the planted area in South India, showed very severe susceptibility with a disease score of more than four, except in Kulasekharam

Table 3. **Severity of *Gloeosporium* leaf disease in South India**

Region	No. of sites	Distribution of disease severity (% of sites surveyed)					
		N	VL	L	M	S	VS
Kulasekharam	12	0	75	25	0	0	0
Punalur	12	0	0	0	42	24	24
Ranni	8	0	0	0	13	50	37
Mundakayam	10	0	0	0	22	47	31
Thodupuzha	16	0	0	0	19	41	40
Trichur	14	0	0	0	37	36	27
Calicut	14	0	0	0	53	27	20
Mangalore	9	0	0	0	45	35	20

Disease score : N = Nil; VL = Very light (0.1-1.0); L = Light (1.1-2.0); M = Moderate (2.1-3.0); S = Severe (3.1-4.0); VS = Very severe (4.1-5.0).

Table 4. **Clonal susceptibility to *Gloeosporium* leaf disease**

Region	Clone		CD (P=0.05)
Kulasekharam	RRII 105	(1.69)	
	PB 28/59	(1.20)	0.21
	PB 260	(1.00)	
	GT 1	(1.64)	
Punalur	RRII 105	(4.70)	
	PB 260	(2.57)	0.10
	PB 217	(2.88)	
	PB 260	(2.42)	
Ranni	RRII 105	(4.35)	
	PB 5/51	(3.24)	0.22
	PB 28/59	(2.89)	
	PB 260	(2.42)	
	PB 217	(2.42)	
Mundakayam	RRII 105	(4.55)	
	PB 217	(2.76)	1.77
	PB 235	(3.30)	
	PB 260	(2.80)	
	PB 28/59	(2.99)	
Thodupuzha	RRII 105	(4.82)	
	PR 255	(4.23)	0.20
	GT 1	(4.38)	
	PB 260	(2.86)	
	PB 217	(2.86)	
	PB 28/59	(2.89)	
Trichur	RRII 105	(4.54)	
	PR 255	(4.23)	0.26
	GT 1	(4.30)	
	PB 217	(2.86)	
	PB 260	(2.86)	
	PB 28/59	(2.89)	
Calicut	RRII 105	(4.31)	
	PB 260	(2.81)	0.22
	PB 217	(2.49)	
	PB 28/59	(2.85)	
	PB 235	(3.24)	
	PB 255	(3.21)	
	PB 311	(2.06)	
	GT 1	(4.58)	
	RRIM 600	(2.84)	
Mangalore	RRII 105	(4.34)	
	PB 260	(2.03)	0.14
	PB 217	(2.44)	
	GT 1	(4.00)	
	PB 311	(2.84)	

Figures in parentheses are mean score values

region. Similar range of susceptibility was also observed in the clones GT 1 and PR 255. Moderate to severe susceptibility was recorded in the clones PB 260, PB 217, PB 311, PB 5/51, PB 28/59, PB 255 and RRIM 600. Tan *et al.* (1992), reported very severe incidence of *Gloeosporium* leaf disease in the clones RRIM 600, PB 235, PB 255, PB 310 and light to moderate incidence in PB 280, PB 28/59, PB 260, PB 217, PB 235, PB 311 and PB 5/51 in Malaysia.

Incidence of the disease in clone RRII 105 is presented in Table 5. Though there was very little variation in the rubber growing areas of Kerala, significantly lower incidence was observed in Kulasekharam area in Tamil Nadu. The highest disease incidence was recorded at Thodupuzha followed by Ranni.

In general, the *Gloeosporium* leaf disease is distributed throughout South India at varying intensity. The data generated through regular disease surveys can form the basis for disease mapping to help disease management.

Table 5. **Incidence of *Gloeosporium* leaf disease on RRII 105 in different areas**

Region	Disease incidence (%)	
Kulasekharam	37.23	(37.40)
Punalur	75.66	(60.43)
Ranni	90.00	(71.65)
Mundakayam	88.33	(70.02)
Thodupuzha	93.00	(74.56)
Trichur	87.00	(68.86)
Calicut	86.43	(63.38)
Mangalore	80.33	(63.67)
Mean	79.74	(64.37)
C.D. (P<0.05)	3.99	

Figures in parentheses are arc sine transformed values

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