

REACTION OF *HEVEA BRASILIENSIS* CLONES AGAINST POWDERY MILDEW DISEASE IN NORTH EASTERN REGION OF INDIA

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The incidence and severity of powdery mildew disease caused by *Oidium heveae* were assessed in forty clones of *Hevea brasiliensis* in different experiments in Assam, Meghalaya, Tripura and northern West Bengal. At the mature stage of growth, the severity of powdery mildew disease was evaluated for three consecutive years during the peak time of the disease (March-April) after wintering. Sixteen clones were found to be moderately tolerant with infection grades ranging from 1.5 to 2.5. Due to repeated massive premature defoliation caused by the disease during March to May, die-back was noticed subsequently in clones PB 5/51, PB 235, RRII 300, RRII 51, RRII 105, RRII 5, RRII 430 and RRIC 105. These clones are therefore rated as highly susceptible to powdery mildew disease.

Key words: Clones, *Hevea brasiliensis*, *Oidium heveae*, Powdery mildew disease, North East India, West Bengal.

Rubber (*Hevea brasiliensis* Muell. Arg.) is emerging as an important plantation crop in North East India and northern part of West Bengal. One of the limitations for rubber cultivation in these regions is occurrence of powdery mildew disease caused by *Oidium heveae*. Mondal *et al.* (1994) reported that owing to the extensive rubber cultivation, the outbreak of powdery mildew disease has become very common in all the rubber growing regions of North East India. The severity of the disease varies with the pattern of wintering, clones, leaf age, planting densities, age of plants, location, elevation and environmental factors (Liyanage, 1976; Mondal *et al.*, 1998). Severe incidence of powdery mildew disease in the absence of chemical control in the clone RRIM 600 has been reported leading to heavy crop loss (Yu

Zhuotong, 1989; Jacob *et al.*, 1992). In addition, repeated attacks result in poor canopy, with consequent adverse effects on girdling and bark renewal (Wastie and Mainstone, 1969; Lim, 1974; Mondal *et al.*, 1998; Mondal and Jacob, 2002). It is therefore essential to evaluate the severity of powdery mildew disease on rubber clones in north-eastern region including northern West Bengal. The severity of powdery mildew disease on forty *H. brasiliensis* clones were evaluated at different research farms in this zone and reported in this study.

The experimental material consisted of rubber plantations under tapping in different research farms of Regional Research Stations of Rubber Research Institute of India located at Sarutari in Assam, Ganolgre in Meghalaya, Taranagar in Tripura and

Nagrakata in northern West Bengal. The incidence and severity of powdery mildew were assessed in forty *H. brasiliensis* clones viz., RRIM 600, RRIM 605, RRIM 612, RRIM 703, RRII 5, RRII 51, RRII 105, RRII 118, RRII 176, RRII 203, RRII 208, RRII 300, RRII 308, RRII 414, RRII 417, RRII 422, RRII 429, RRII 430, RRIC 52, RRIC 100, RRIC 102, RRIC 104, RRIC 105, PB 86, PB 217, PB 235, PB 260, PB 280, PB 310, PB 311, PB 5/51, GT 1, GI 1, PR 107, PR 255, Harbel 1, SCATC 88/13, SCATC 93/114, Haiken 1, PR 261) during the peak time of the disease (March-April) for three consecutive years. Observations were recorded from a random sample of ten representative trees of each clone. The incidence of powdery mildew disease was assessed from immature top whorl of leaves on five twigs selected at random from each experimental tree. For a visual scoring and classification of severity, a

scale of 1 to 5 was used, where 1 = healthy, 2 = up to 15 per cent, 3 = 15 to 30 per cent, 4 = 30 to 50 per cent and 5 = more than 50 per cent of the leaf area infected. For estimation of severity, the sum of infection grade of each sample was divided by the total number observed, which included both infected and non-infected leaflets (Samaradeewa *et al.*, 1985). To estimate disease incidence, the total number of leaflets and the total number of diseased leaflets per twig of a tree were recorded and the per cent disease incidence was calculated. The incidence of die-back was assessed visually during July-August.

The effect of powdery mildew disease on *H. brasiliensis* clones evaluated from different clone trials in these regions are presented in Tables 1 and 2. Severity was found to be low in 16 clones (PB 86, RRII 414, RRII 429, RRII 417, RRIM 600, RRIM 703, Haiken 1, SCATC 88/13, SCATC 93/114, PB 310, PB 311,

Table 1. Incidence and severity of powdery mildew disease on *H. brasiliensis* clones in Assam and Meghalaya (mean of three years)

Clone	Sarutari Farm, Assam			Ganolgre Farm, Meghalaya		
	Disease incidence(%)	Severity	Tolerance/susceptibility	Disease incidence(%)	Severity	Tolerance/susceptibility
RRII 105	100.0	4.2	HS	100.0	4.1	HS
RRII 118	100.0	2.7	S	100.0	2.6	S
RRII 203	70.0	2.5	MT	50.0	2.5	MT
RRII 208	80.0	2.5	MT	60.0	2.5	MT
RRII 5	100.0	4.5	HS	100.0	4.2	HS
RRIM 600	80.0	2.0	MT	60.0	2.0	MT
RRIM 605	100.0	3.0	S	70.0	2.8	S
PB 86	50.0	1.5	T	40.0	1.4	T
PB 235	100.0	5.0	HS	100.0	4.3	HS
PB 5/51	100.0	5.0	HS	100.0	4.5	HS
PB 310	80.0	2.5	MT	60.0	2.4	MT
PB 311	70.0	2.5	MT	60.0	2.4	MT
PB 260	100.0	2.7	S	75.0	2.6	S
GT 1	80.0	2.5	MT	70.0	2.3	MT
GI 1	100.0	3.5	S	100.0	3.0	S
RRII 102	100.0	3.0	S	100.0	2.8	S
RRII 105	100.0	4.3	HS	100.0	4.1	HS
PR 255	100.0	3.5	S	100.0	3.3	S

Table 2. Incidence and severity of powdery mildew disease on *H. brasiliensis* clones in Tripura and northern West Bengal (Mean of three years)

Clone	Northern West Bengal			Tripura		
	Disease incidence (%)	Severity	Tolerance/susceptibility	Disease incidence (%)	Severity	Tolerance/susceptibility
RRII 105	100.0	4.5	HS	100.0	4.1	HS
RRII 118	100.0	2.9	S	100.0	2.7	S
RRII 203	80.0	2.5	MT	70.0	2.5	MT
RRII 208	90.0	2.5	MT	80.0	2.5	MT
RRIM 600	80.0	2.5	MT	75.0	2.5	MT
RRIM 605	100.0	3.5	S	100.0	3.2	S
PB 86	50.0	1.8	T	40.0	1.5	T
PB 235	100.0	5.0	HS	100.0	4.5	HS
PB 5/51	100.0	5.0	HS	100.0	4.5	HS
PB 311	80.0	2.5	MT	70.0	2.5	MT
PB 260	100.0	3.0	S	100.0	2.9	S
GT 1	80.0	2.5	MT	70.0	2.5	MT
RRIM 703	70.0	2.2	MT	60.0	2.0	MT
GI 1	100.0	4.0	S	100.0	3.5	S
SCATC 88/13	70.0	2.2	MT	70.0	2.0	MT
SCATC 93/114	80.0	2.5	MT	70.0	2.2	MT
Haiken 1	60.0	2.3	MT	65.0	2.0	MT
PR 107	100.0	3.8	S	100.0	3.5	S
PB 217	100.0	2.9	S	100.0	2.8	S
RRIM 612	100.0	3.5	S	100.0	3.0	S
RRII 176	75.0	2.5	MT	70.0	2.2	MT
RRIC 100	70.0	2.5	MT	70.0	2.4	MT
RRII 414	90.0	2.5	MT	75.0	2.4	MT
RRII 417	75.0	2.2	MT	70.0	2.1	MT
RRII 422	100.0	2.8	S	100.0	2.7	S
RRII 430	100.0	4.5	HS	100.0	4.2	HS
RRII 429	60.0	2.0	MT	50.0	1.9	MT
RRII 51	100.0	4.5	HS	100.0	4.2	HS
PB 310	80.0	2.5	MT	-	-	-
RRIC 102	100.0	3.2	S	-	-	-
PB 280	100.0	2.7	S	-	-	-
RRII 308	100.0	3.7	S	-	-	-
PR 261	100.0	3.5	S	-	-	-
RRIC 104	100.0	3.7	S	-	-	-
RRII 300	100.0	4.2	HS	-	-	-
Harbel 1	-	-	-	100.0	2.8	S
RRIC 52	-	-	-	100.0	3.0	S
RRII 5	-	-	-	100.0	4.5	HS
RRIC 105	-	-	-	100.0	4.3	HS

S = Susceptible; HS = Highly susceptible; T = Tolerant; MT = Moderately tolerant and - = not available

RRII 203, RRII 208, GT 1, RRIC 100 and RRII 176) with infection grades between 1.5 and 2.5, though their per cent disease incidence scores ranged from 50 to 80. These clones did not show die-back damage. High

incidence (above 95 per cent) and severity (infection grade above 3.5) of powdery mildew disease was noticed in eight clones (PB 5/51, PB 235, RRII 105, RRII 300, RRII 51, RRII 430, RRIC 105 and RRII 5).

Due to repeated massive premature defoliation caused by the disease from March to May, comparatively severe die-back damage was noticed in these clones during July-August clearly indicated their high susceptibility to powdery mildew in the areas studied. The severity of the disease was comparatively higher in northern West Bengal than in the other regions studied, which might be due to the presence of congenial agro-climatic factors in that area. However, the clones which had low powdery mildew disease in northern West Bengal behaved similarly in the other north eastern states also. It may also be concluded that the clones, PB 5/51, PB 235, RRII 300, RRII 430, RRII 105,

RRII 51, RRIC 105 and RRII 5 are highly susceptible to powdery mildew disease and therefore, their planting may be restricted in this zone.

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