

Responses of some *Hevea brasiliensis* clones to major leaf and stem diseases in higher elevations of Karnataka

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Abstract

Cultivation of rubber (*Hevea brasiliensis*) in both plains as well as at higher elevations of Karnataka experiences outbreak of various diseases. Important among them are leaf diseases like abnormal leaf fall, powdery mildew, Colletotrichum leaf spot and Corynespora leaf fall. Among the diseases affecting the stem, pink and patch canker diseases cause serious damage during rainy season. A study, conducted at higher elevations in the Regional Research Station, University of Agricultural Sciences, Mudigere, Chikamagalore district, Karnataka, to assess the susceptibility of twelve *Hevea* clones for major leaf and stem diseases revealed that, powdery mildew is the major disease, and among clones assessed, RRIM 501 and PB 235 recorded >80 per cent disease intensity and hence, are highly susceptible to powdery mildew. Mild to light (9-34%) intensity of abnormal leaf fall disease was recorded. Occurrence of various stem diseases was very mild and disease was absent in some clones.

Key words: Leaf and stem diseases, clonal susceptibility, rubber, higher elevation, Karnataka.

Introduction

Non-traditional rubber growing areas of India, which lie beyond 10° N, possess a spectrum of adverse factors, which hamper rubber (*Hevea brasiliensis*) cultivation. These factors, both biotic and abiotic, greatly vary from region to region. Rubber trees suffer from several diseases at different growth stages. The abnormal leaf fall (ALF) caused by *Phytophthora* spp. and *Colletotrichum* leaf spot caused by *Colletotrichum acutatum* (CLS), powdery mildew (PM) caused by *Oidium heveae* and Corynespora leaf fall (CLF) disease caused by *Corynespora cassiicola*, pink disease caused by *Corticium salmonicolor* and patch canker caused by *Phytophthora* spp are the major threats to rubber growers in the plain region of Karnataka. Abnormal leaf fall, Colletotrichum leaf spot, pink and patch canker diseases appear during rainy season whereas, powdery mildew and Corynespora leaf fall disease occur regularly during the dry season, just after winter. Abnormal leaf fall is reported to cause a yield loss of 30 to 50 per cent (Ramakrishnan, 1960) and reduction in production of 7

to 45 per cent due to Colletotrichum leaf spot disease has also been reported (IRRDB, 1994). Severe outbreak of powdery mildew was reported to cause a yield loss of 14 to 29 per cent through out the year (Jacob *et al.* 1992). Also there are reports of epidemics of Corynespora leaf fall disease which caused economic losses to rubber growers (Manju *et al.*, 2001). Compared to plains of Karnataka, the damage due to powdery mildew is more prominent in high elevations as it appears regularly during the season. As the rubber growing regions of Karnataka experience disease out breaks at varying intensity through out the year and considering the dynamic nature of disease intensity in some recommended clones, the present investigations were undertaken to study the performance of some *Hevea* clones to major leaf and stem diseases in high altitude of Karnataka.

Materials and Methods

The field study was carried out at the large scale clone evaluation trial laid out and planted by the Plant Physiology Division, Rubber Research Institute of India,

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Table 1. Intensity of major leaf diseases in some clones of *Hevea* in high elevation region of Karnataka.

Clone	Per cent disease intensity					
	2001		2002		2003	
	ALF	PM	ALF	PM	ALF	PM
PB 235	25.50 bc	89.00 a	27.50 b	91.60 a	24.700 b	83.20 a
GT 1	9.10 g	43.30 e	11.88 f	41.30 f	12.40 f	35.20 f
RRIM 612	20.90 b-d	43.20 e	24.50 bc	42.40 ef	23.40 bc	35.60 f
RRIM 703	14.40 ef	57.80 c	15.80 d-f	63.70 c	12.50 ef	56.00 c
RRIM 501	19.70 b-d	88.40 a	20.00 c-e	89.50 a	18.40 c-e	82.30 a
RRIM 600	30.40 a	49.60 d	34.00 a	52.00 d	31.60 a	41.90 de
RRII 118	12.90 fg	44.60 e	13.00 f	41.30 f	14.20 d-f	37.00 ef
RRII 105	15.00 ef	65.60 b	14.50 ef	67.10 c	16.50 d-f	55.70 c
RRII 300	18.20 de	67.10 b	20.00 c-e	80.70 b	15.70 d-f	67.70 b
TJIR 1	23.90 b	48.40 d	25.00 bc	47.80 de	20.00 b-d	45.10 d
GI 1	20.60 b-d	50.30 d	22.40 bc	46.90 d-f	20.00 b-d	39.60 d-f
PR 107	19.30 c-d	47.00de	21.00 cd	42.80 ef	18.50 cd	34.90 f

ALF – Abnormal leaf fall; PM – Powdery mildew

* Means followed by the same letters under each season are not significantly different by LSD at $P \leq 0.05$

Kottayam, at the Regional Research Station, University of Agricultural Sciences, Mudigere, Chikkamagalore district, Karnataka. This station is situated at an altitude of 982 m above MSL, receiving an average annual rainfall of about 2300 mm in a year with maximum temperature ranging from 31 to 33 °C and minimum temperature from 10 to 14 °C. Screening of *Hevea* clones for major leaf and stem disease resistance was done in the field under natural infection condition. The study covered major leaf diseases of rubber viz., Abnormal leaf fall (ALF), Colletotrichum leaf spot (CLS), Powdery mildew (PM) and Corynespora leaf fall (CLF), stem diseases included are Pink disease, Dry rot and Patch canker. A total of 12 clones were included in the study and the disease assessment was done in three consecutive years from 2001 to 2003. Observations were recorded for the clonal susceptibility during the peak disease season. July-September for abnormal, Colletotrichum, pink and dry rot and March-April are the peak period for Corynespora leaf fall and powdery mildew diseases. The severity of the disease was assessed on a 0 - 5 scale for leaf diseases based on the intensity of spotting, deformation and leaf fall and disease incidence was recorded for stem diseases. The per cent disease intensity was calculated from the average disease score by using formula of Horsfall and Heuberger (1942).

Results and Discussion

The degree of susceptibility of the *Hevea* clones for major leaf diseases in the high elevation region of Karnataka is presented in Table 1. Since, the intensity of Colletotrichum leaf spot, Corynespora leaf fall and all the stem diseases were very mild and not found regularly, only the PDI of abnormal leaf fall and powdery mildew was calculated and subjected to statistical analysis.

Results of the study indicated that, powdery mildew is the major leaf disease of rubber after winter in the high elevation of Karnataka. All the clones under study were found to be infected with both powdery mildew and abnormal leaf fall disease.

Among the twelve clones, PB 235 and RRIM 501 recorded highest disease intensity in all the three years (>80 per cent) and hence, were categorised as highly susceptible to powdery mildew disease. Clone RRIM 703, GI 1, RRII 105 and RRII 300 showed moderate infection while the clone RRIM 600, PR 107, Tjir 1, RRII 118, RRIM 612 and GT 1 recorded less disease intensity (<50 per cent) and hence, are comparatively less susceptible to powdery mildew. The susceptibility to abnormal leaf fall disease varied with the clones. The clone RRIM 600 recorded 34 per cent disease intensity followed by PB 235 (27.5 per cent) and Tjir 1 (25 per cent). All the other clones showed low disease intensity (9.1 to 23.4 per cent). In general, all the clones showed less susceptibility for abnormal leaf fall disease. Occurrence and intensity of all the stem diseases were very mild and often diseases were not observed in majority of the clones. Prevalence of powdery mildew in higher elevations may be due to the presence of susceptible clone, cool climate, heavy dew and mist during refoliation after winter (Edathil *et al.*, 2000). An optimum temperature of 25 to 30 °C favours the disease development (Liyanage *et al.*, 1985). Such predisposing conditions prevail in the rubber growing areas in higher elevations of Karnataka and hence occurrence of powdery mildew disease dominates.

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