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## Assessment of tar spot disease in *Dalbergia latifolia* and their management

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**Abstract**

*Dalbergia latifolia* (Rose wood) is important valuable timber yielding tree species with good suitability to Agro-forestry. For raising plantation and to meet the demands of farmers good quality seedlings plays an important role. During nursery stages, huge mortality occurs due to incidence of diseases, which affect intern quality regeneration and growth of seedlings. In order to meet the growing demand for *Dalbergia latifolia*, healthy seedling production in nurseries is essential. Hence, the present study was carried out to assess the disease incidence in *Dalbergia latifolia* at nursery stages. Seedling leaf tar spot disease of *Dalbergia latifolia* was observed at Sirsi, College of Forestry nursery in August to November 2017 in Central Western Ghats of Karnataka, India. The causal organism was identified as *Phyllochora dalbergiae*. In nursery, highest disease incidence (70.18%) and Per cent Disease Index (56.81%) was recorded in November with the evidence of premature defoliation with an indication of periodical progression of disease magnitude. In *in-vivo* disease management, seedlings were treated with seven fungitoxicant chemicals. Among them Carbendazim (0.2%) and Propiconazole (0.1%) showed highest disease reduction of 30.09 per cent and 25.42 per cent, respectively.

**Keywords:** *Dalbergia latifolia*, nursery diseases, tar spot, disease incidence, per cent disease index and carbendazim

**Introduction**

*Dalbergia latifolia* (Syn. *Dalbergia emarginata*) is a premier timber species commonly known as Indian Blackwood and Rosewood. It is native to low-elevation of tropical monsoon forest of South East India. The tree has grey bark that peels in long fibres, pinnately compound leaves and bunches of small white flowers. It grows as both an evergreen and a deciduous tree in the deciduous monsoon forests of India. It grows in the sub Himalayan track from Oudh eastwards to Sikkim, Bihar, Orissa and throughout central and southern India. It is planted as a shade tree in coffee plantations and on roadsides; being a nitrogen fixing tree and slow leaf litter decomposition it is used as mulch in crop production and also intercropped with annual crops or fruit tree [1].

It is used to make premium-grade furniture, paneling, veneers and interior and exterior joinery. Secondary uses of the wood include knife handles, musical instruments, agricultural implements calico-printing blocks, mathematical instruments and boat keels and screws. Medicines made from the bark tannins are used against diarrhoea, worms, indigestion, leprosy and as appetizer [2].

For large scale plantation, seedlings of *Dalbergia latifolia* are raised in nurseries. The seedlings raised in nursery beds as well as in polyethylene bags suffers from many disease causing mortality and affecting the health and vigorous of plants.

To find out the most susceptible stage of the seedling is an important preliminary step that helps in understanding the exact stage of disease establishment to develop effective disease management strategies in order to reduce further spread of disease. Hence, this study was undertaken on disease estimates, symptomology and management of Tar spot of *Dalbergia latifolia*.

**Materials and Methods**

The present study was conducted in the Department of Forest Biology and Tree Improvement, College of Forestry nursery, Sirsi, Uttara Kannada (Karnataka), to document periodical disease incidence (DI), Percent disease index (PDI) and disease severity during the month of August - November, 2017.

$$\text{Percent Incidence} = \frac{\text{Number of seedling affected} \times 100}{\text{Total number of seedlings affected}}$$

Disease Severity = Recorded on 0-5 severity grades.

Percent Disease Index (PDI):

$$\text{PDI (\%)} = \frac{\text{Sum of numerical ratings of all the leaves}}{\text{Total number of leaves observed} \times \text{Maximum grade used}} \times 100$$

### Identification of Pathogen

Diagnosis and identification of causal organism were done in laboratory. The pathogen was cultured in petri-dish using sterilized Potato Dextrose Agar (PDA) medium inoculated with surface sterilized diseased bits of infected sample bits with healthy tissue of diseased leaves. After 5 days of incubation at  $28 \pm 2^\circ\text{C}$  whitish wooly growth of fungal colony appeared in petri dish. For microscopic study, slides were prepared in lactophenol and cotton blue staining reagent and studied under different magnification using advance research microscope and photographs were taken.

### Pathogenicity test

The pathogenicity was proved as per Koch's postulates by inoculating the healthy seedlings with fungal spore suspension. The spore suspension of pathogen was prepared ( $4 \times 10^3$  cfu/ml) from 15 days old culture and 30 ml of spore suspension was inoculated in healthy plants leaves (5 seedlings). The same pathogen was reisolated from inoculated affected leaves in pure form and identified as *Phyllochora dalbergiae*.

### Disease control

The seedlings were fortnightly treated with 7 fungitoxicants at different concentration and an evaluation of these chemicals was done at nursery of College of Forestry, Sirsi. Seven fungicides with different concentrations were Contof @ 0.1%, Bavistin @ 0.2%, Tilt @ 0.1%, Folicure @ 0.1%, Dithane M-45 @ 0.2%, Saaf @ 0.2% and Luna experience @ 0.1% against Tar spot of *Dalbergia latifolia*. The test seedlings were given 2 sprays at 15 days interval. The observations on disease severity was recorded once before first spray and twice, one each after 15 days of first and second spray. Percent Disease Index was estimated based on severity scale. Percent reduction in the treatments over control was also assessed.

### Results and discussions

The disease appeared after the early rainfall in late July and continued up to September. The infected leaves showed deep coal tar like raised specks with faint yellow halo appear on upper surface of leaf where they shiny black, cushiony ascomata developed singly or in clusters and later developed

to large sized spots covering entire leaf and rarely appears on lower surface of leaf. Leaf affected area turned pale and gradually to light brown colour. Mature leaves showed high severity and pre-mature defoliation. Total 30 seedlings were observed and recorded the number of affected seedlings and at same time record the per cent of leaf area damaged. Disease Incidence, Per cent Disease Index ranged between 43.47% to 70.18% and 38.33% to 56.81% in the month of August to November (Table 1). The pathogens produced large number of viable conidia in nursery, thereby, causing severe damage to the seedlings. The progression of tar spot over different months can be attributed due to high humidity, moderate temperature and drizzling weather. These results were in line with reports on severity range from 16.70 to 33.30 per cent seedling die back of *Dalbergia latifolia* [3].

### Pathogen

The causal organism of Tar spot of *Dalbergia latifolia* was identified as *Phyllochora dalbergiae*.

**Organism description:** Colonies hypophyllous, mycelium was immersed, branched, septate, and pale brown. Conidiomata eustromatic, multilocular uniting in ostiolar region, base lateral and upper walls brown, thick walled textura angularis. Ostiole was single, circular, central, sometimes papillate. Conidiophores were not observed. Conidiogenous cells were holoblastic, determinate, hyaline, filiform, formed from the inner walls of locules Conidia oval to ellipsoidal, dark brown, smooth to rough thick walled 4-8 x 2.5-5.0  $\mu\text{m}$  size.

### Management of disease

The results showed that seedling treated with fungitoxicants of Carbendazim 50 per cent WP ( $T_2$ ), Propiconazole 25 per cent EC ( $T_3$ ) and Fluopyram+Tebuconazole 17.7 per cent SC ( $T_7$ ) found highly effective in reducing the tar spot of *Dalbergia latifolia*. The per cent of disease over control in these treatments was 36.09 per cent, 33.17% per cent 26.87 per cent respectively (Table. 2). Carbendazim+ Mancozeb was less effective in disease control followed by Hexaconazole 5 per cent (0.1%) and Mancozeb 75 per cent WP (0.2%). Hence, for control of Tar spot disease in *Dalbergia latifolia*, fungitoxicants of Carbendazim 50 per cent WP, Propiconazole 25 per cent EC and Fluopyram+Tebuconazole were more effective. These results were in line with reports on effectiveness of 0.1 per cent Propiconazole and 0.1 per cent Difenconazole in reducing severity of leaf spot and blight of *Pongamia pinnata* [4], and 0.2 % redimol was fully controlled the root rot disease of *Madhuka indica* [5].

**Table 1:** Disease incidence and Percent disease index of Tar spot of *Dalbergia latifolia*

Month	Disease Incidence (%)	Percent Disease Index (%)
August	43.47	38.33
September	57.40	51.92
November	70.18	56.81
Mean	57.01	49.02

**Table 2:** Evaluation of fungicides against Tar spot of *Dalbergia latifolia*

Treatment	Concentration (%)	Per cent Disease Index (PDI)			Per cent reduction in PDI over control		
		Before spray	15 days After I spray	15 days After II spray	15 days after I spray	15 days after II spray	
$T_1$	Hexaconazole 5% EC	0.1	19.02	22.83a	25.24b	16.47	18.03
$T_2$	Carbendazim 50% WP	0.2	18.98	20.44a	21.89a	30.09	36.09
$T_3$	Propiconazole 25% EC	0.1	17.48	21.37a	22.37a	24.43	33.17

T <sub>4</sub>	Tabuconazole 25.9% EC	0.1	18.83	23.07b	24.58b	15.26	21.20
T <sub>5</sub>	Mancozeb 75% WP	0.2	18.22	22.94b	24.53b	15.91	21.44
T <sub>6</sub>	Carbendazim+ Mancozeb	0.2	19.23	24.73b	24.88b	7.52	10.54
T <sub>7</sub>	Fluopyram+Tebuconazole 17.7%SC	0.1	19.24	21.2a	23.48a	25.42	26.87
T <sub>8</sub>	Control		19.28	26.59b	29.79b		
	SEm ±		0.60	0.71	0.77		
	CD at 5% level		1.80	2.13	2.30		

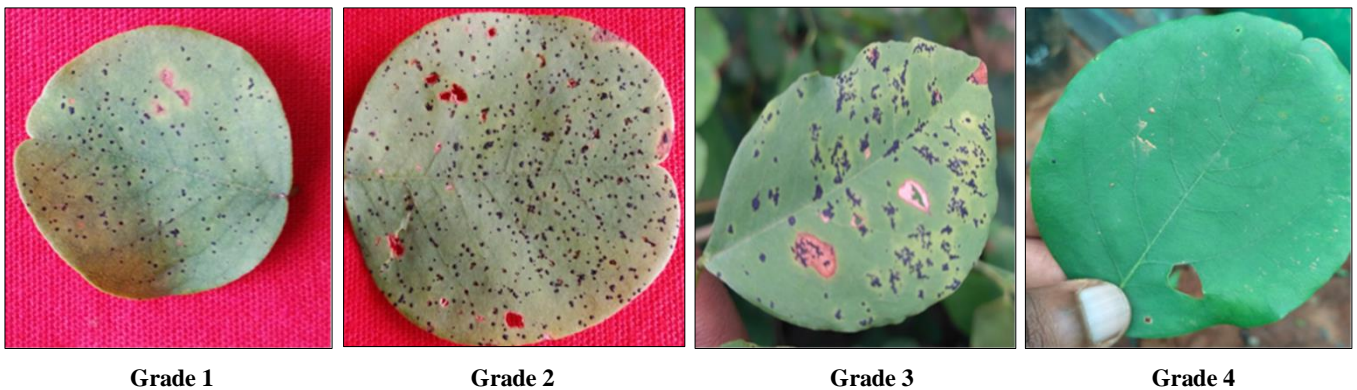


Plate 1: Photos of disease incidence severity grade of Tar spot of *Dalbergia latifolia*



*Phyllochora dalbergiae*

Mycelium of *Phyllochora dalbergiae*

Plate 2: Photos of mycelium and pathogen of *Phyllochora dalbergiae*

### Conclusion

*Dalbergia latifolia* is most valuable timber species of India and highly valued for furniture and decorative items. Hence there is a huge demand for *Dalbergia latifolia* during nursery stages seedlings are affected with Tar spot disease. The tar spot disease of *Dalbergia latifolia* caused by *Phyllochora dalbergiae* and Disease Incidence and Per cent Disease Index ranges from 43.47 per cent to 70.18 per cent and 38.33 per cent to 56.81 per cent in the month of August to November. This disease was effectively controlled by application of Carbendazim @ 2 % and Propiconazole @ 1%. Hence use of these two fungitoxicants play effective role in control of Tar spot disease and eventually to produce healthy and good quality seedlings for establishment of *Dalbergia latifolia* plantation and also to meet the demand of farmers.

### References

1. Khalid M, Siddiqui HH, Sheeba F. *In vitro* assessment of antioxidant activity of *Dalbergia latifolia* barks extract against free radicals. American-Eurasian Journal of Scientific Research (AEJSR). 2011; 6(3):172-177.
2. Nagarjun N, Suryanarayana V. Documentation of nursery diseases of *Pongamia pinnata* and developing effective management package in Haveri Forest Division. KSCST: SPP-37<sup>th</sup> series: Biofuel Projects Compendium, 2014, 112-115.
3. Poonam V, Fatima S, Verma KR. Root rot disease of *Madhuka indica* (Mahua): A new record. International Journal of Current Research. 2016; 7(6):16751-16754.
4. Rao RVG, Madhavi ERA, Venkataramana Y. A review on medicinal plants with potential hypolipidemic activity. International J Pharmacy Biological Sciences. 2013; 4(4):729-740.
5. Verma P, soni KK, Verma KR, Fatima S. Seedling die back of *Dalbergia latifolia* in central India caused by *Colletotrichum capsici*- A new record. International Journal of Current Microbiology and Applied Sciences. 2015; 5(6):350-356.