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Documentation of Nursery Disease of Teak in Forestry Plantation

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ABSTRACT: Teak (*Tectona grandis*) is one of the most important timber trees of India and South-east Asia were grown in various states like Madhya Pradesh, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh and Kerala. The Teak grown nurseries were affected by several pest and diseases, hence to record the incidence of pest and diseases the survey was conducted. Survey was conducted during 2022-23 in forest nurseries of various places of Coimbatore districts *viz,* Mettupalayam, Sirumugai, Madukkarai, Walayar and Coimbatore Teak nurseries. Various foliar diseases *viz* Powdery Mildew caused by *Pseudo oidium tectonae,* Leaf rust (*Olivea tectona*), leaf spot (*Cercospora* sp)along with wilt caused by *F.oxysporum* were recorded. Leaf rust, leaf spot existed throughout the season in the nursery while the powdery mildew observed during May-June and October to December, the incidence of root diseases was also noticed throughout the season in the nurseries. Among the diseases, the incidence of *Cercospora* leaf spot (29.8 PDI) and Root rot (38.1%) were severe in Teak nurseries.

The diseases and their prevalence might vary in other regions and over different years. The study identified some diseases based on symptoms, but a more detailed analysis involving molecular techniques could provide accurate identification of pathogens, strains, and their genetic diversity. The study focused on individual pathogens, but interactions between different pathogens might exacerbate disease severity. These are some of the challenges of this study. This study also contributes valuable information by documenting the presence and severity of various diseases affecting Teak seedlings in forest nurseries .It also identified seasonal patterns of disease occurrence, which is crucial for developing targeted disease management strategies and optimizing resource allocation. The study provides a foundation for future research endeavors, such as investigating the genetic diversity of pathogens, understanding disease interactions, and developing effective disease control methods.

Keywords: Teak, Survey, Incidence, Root rot, *cercospora* leaf spot.

INTRODUCTION

India is renowned for its rich and diverse forest cover, spanning across various regions and ecosystems. Forests in India play a significant role in supporting biodiversity, preserving ecological balance, mitigating climate change. Even in the scenario where all other sources of carbon emissions were to stop immediately, the ongoing tropical deforestation is projected to contribute to a rise of 1.5 °C in global warming by the conclusion of this century (Mahowald *et al.,* 2017). Teak (*Tectona grandis*) is one of the most important timber trees of India and South-east Asia. In India Teak is distributed naturally in the Peninsular region below 24°N latitude. Teak forests are found in Madhya Pradesh, Maharashtra, Tamil Nadu, Karnataka and Kerala besides Uttar Pradesh, Gujarat, Orissa, Rajasthan, Andhra Pradesh and Manipur. In Teak grown nurseries, seedlings are affected by several pest and diseases. Among them root rot is a major disease cause losses upto 38.0%. Firdousi (2019) isolated the teak pathogens viz., *Uncinula tectonae*, *Olivea tectonae*, *Rhizoctonia solani*, *Armillaria mellae* and *Phellinus* sp in Jalgaon district (M.S). Bakshi (1976) noted that a number of fungal nursery diseases, including root rot *(Polyporus zonalis),* powdery mildews *(Uncinula tectonae),* and leaf rust *(Olivae tectonae),* affected teak seedlings in India. Mohanan and Sharma (2005) claim that forest nurseries in regions with abundant rainfall, like Kerala, frequently experience major fungal diseases. Kiran *et al*. (2021) from Kerala documented and characterized nine important fungal diseases in nursery seedlings of Teak. In the present study investigation on survey was conducted to document the occurrence of diseases in forest Teak nurseries.

MATERIAL AND METHODS

A. Documentation of the diseases

Survey was conducted in Forest Nurseries for the occurrence of disease in Teak seedlings during 2022-23 in places *viz.,* Sirumugai, Mettupalyam, Coimbatore, Madukkarai, Walayar. The incidence of foliar diseases *viz*., leaf spot, leaf blight, powdery mildew and rust were assessed using PDI method. The incidence of root

diseases viz., wilt and root rot were assessed by using Percentage disease incidence method.

The percent disease incidence was calculated using the following standard formula

$$\text{Percent Disease Incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

$$\text{Percent disease index} = \frac{\text{Sum of individual ratings}}{\text{Number of plants examined} \times \text{Maximum disease scale}} \times 100$$

Severity of the disease was assessed by using 0-5 scale devised by Mayee and Datar (1986) where 0 means no visible symptoms on foliage/fruits while a rating of 5 would suggest more than 70% infection. Percent Disease Index (PDI) was then worked out by using equation as suggested by Wheeler (1969).

RESULT AND DISCUSSION

Survey was conducted in different areas of Coimbatore district *viz.*, Coimbatore, Madukkarai, Walayar, Sirumugai and Mettupalyam. In the surveyed places the incidence of rust, leaf spot, powdery mildew, wilt and root rot were recorded in Teak nursery. In this, incidence of powdery mildew was noticed in June to July month and Rust in October to December. while leaf spot, wilt and root rot were noticed throughout the year. Among the places surveyed the incidence of powdery mildew were high which recorded 62.3 PDI in Sirumugai followed by 48.9 PDI in Walayar. In Madukkarai area, the incidence of rust and leaf spot was more which recorded 20.9% and 29.8 PDI respectively (Fig. 1). Incidence of wilt was minimum in Sirumugai (12.3%) while it was maximum in walayar, No incidence was recorded in Coimbatore nursery and Root rot was minimum (8.3%) in coimbatore while maximum in sirumugai (28.1%) (Fig. 2). Bakshi (1976) noted that a number of fungal nursery diseases, including root rot (*Polyporus zonalis*), powdery mildews (*Uncinula tectonae*), and leaf rust (*Olivea tectonae*), affected teak seedlings in India. Teak seedlings in Kerala have been observed to have foliar diseases brought on by *Curvularia* Balasundaran (2002); Mohanan *et al*. (2004), *Alternaria* (Mohanan *et al*., 2010), and *Colletotrichum* (Sharma *et al*., 1985; Mohanan, 2007).

Table 1: Percent disease Index &Incidence of Teak Nursery diseases in Coimbatore districts.

Sr. No.	Teak nursery disease	Occurrence	Percent disease Incidence(%) & Percent disease Index				
			Coimbatore	Madukkarai	walayar	Sirumugai	Mettupalyam
1.	Rust	Oct-Dec	12.3 (PDI)	20.9 (PDI)	17.6 (PDI)	8.5 (PDI)	10.5 (PDI)
2.	Leaf spot	All the seasons	18.5 (PDI)	24.8 (PDI)	–	16.3 (PDI)	9.4 (PDI)
3.	Powdery mildew	Jun-july	42.6 (PDI)	22.8 (PDI)	48.9 (PDI)	62.3 (PDI)	11.3 (PDI)
4.	Wilt	All the seasons	–	14.6 %	23.2 %	12.3 %	19.5 %
5.	Root rot	All the seasons	8.3 %	10.6 %	24.1 %	28.1%	12.8 %

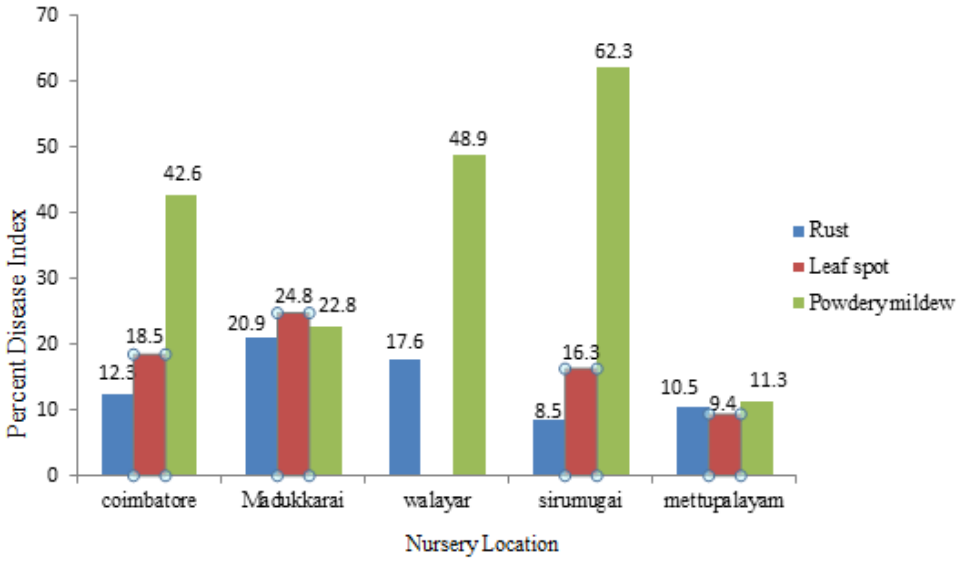

Fig. 1. Percent disease Index of different nursery locations.

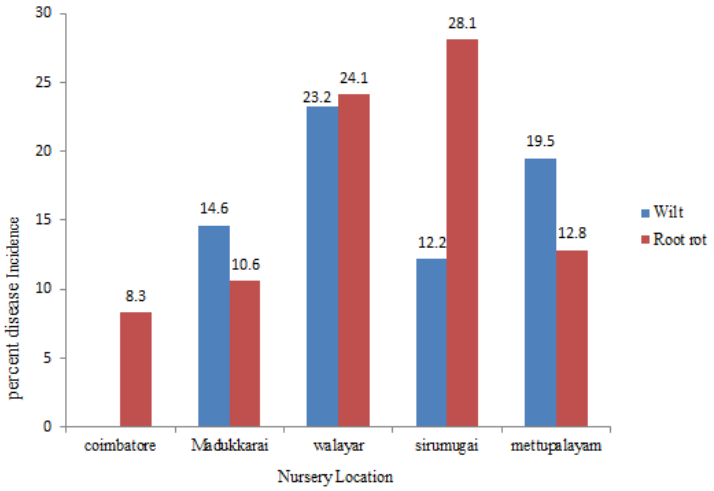

Fig. 2. Percent disease Incidence of different nursery locations.

In all surveyed commercial fields in Brazil, vascular tissue discoloration, heartwood rot, and dieback of teak caused by *L. theobromae* varied from 5% to 10%. (Borges *et al.*, 2015). Jamaluddin *et al*. 1997 observed that *Fusarium moniliforme* causes major damage to forests in several places of India and causes wilt of numerous tree species, including *Tectona grandis*, *Azadirachta Indica*, *Cassia fistula*, etc. According to Murali *et al*. (2007) Teak plant *L. theobromae* are what kills twigs. Earlier reports of collar rot (*Rhizoctonia solani)* of teak seedlings in Kerala forest nurseries were made by Ali and Florence (1994); Mohanan *et al*. (2010); Pathak *et al*. (2015)., Murthy *et al.* (2013).

CONCLUSIONS

In conclusion, the survey conducted in various forest nurseries of Coimbatore district revealed the presence of several diseases affecting Teak seedlings. The foliar diseases observed were Powdery Mildew caused by *Pseudo oidium tectonae*, Leaf rust (*Olivea tectonae*), and Leaf spot (*Cercospora* sp), while the root diseases included Wilt caused by *F. oxysporum* and Root rot. The severity of these diseases varied across the surveyed locations and seasons. Among the diseases, Powdery Mildew showed a significant incidence in Sirumugai (62.3% PDI) and Walayar (48.9% PDI), while Rust was more prevalent in Madukkarai (20.9% PDI). Leaf spot was widely distributed across all seasons, and the incidence varied from one location to another. Wilt and Root rot were observed throughout the year, with varying degrees of severity in different nurseries. The findings highlight the importance of monitoring and managing these diseases in Teak nurseries to minimize their impact on seedling health and growth. Effective disease management practices should be implemented to safeguard the Teak saplings, which are essential for the sustainable supply of this valuable timber tree.

FUTURE SCOPE

Based on the survey results, further research can focus on developing effective disease management strategies for controlling the identified diseases. This could include evaluating the efficacy of various fungicides, biocontrol agents, and cultural practices to reduce disease incidence in Teak nurseries.

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Conflict of Interest. None.

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