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## PATHOGENIC DISEASE OCCURRENCES IN PLANTATION SITES OF BASTAR DISTRICT, CHHATTISGARH, INDIA

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### ABSTRACT

The investigation on “Pathogenic disease occurrence in plantation sites of Bastar district, CG, India” revealed that the several disease of *Tectona grandis* and *Eucalyptus globules* trees species in the plantation site maintained by Bastar forest division (C.G.) During the survey of plantation sites, many trees were infected by pathogens. The infected teak species showed leaf spot, leaf blight, leaf gull, leaf brown spot, stem canker, powdery mildew etc. and affecting the growth and form of teak. Whereas in Eucalyptus trees showed stem canker, collar rot, leaf spot, leaf rust, brown leaf spot, disease and affecting the growth and forms of Eucalyptus. The survey was conducted at two plantation sites namely Titraon and Bastar in the region and incidence of pathogenic disease commonly found and casual organism/pathogen were identified prescribed disease management was recorded. Management of immediate removal of infected plants helps to prevent the disease spread. Therefore, the present investigation was carried out for knowing occurrence and abundance of pathogens associated with Teak and Eucalyptus trees plantation in the Bastar district of Chhattisgarh.

**Keywords:** Pathogenic disease, Tree species, Plantation, Bastar.

### INTRODUCTION

Forest is the second largest land use in India next to agriculture. The forest and tree cover of India is assessed as 78.29 million hectares which constitute 23.81% of the country's geographical area, ranging from the Himalayan Temperate to the dry Deciduous forests (FSI, 2011).

The demand for wood in the year 2020 is projected to be 153 million m<sup>3</sup> for industrial wood and 437 million m<sup>3</sup> for fuel wood i.e., a rise of about 164% and 47%, respectively (Parcel, 2005). Further, the National Forest policy, 1988 stipulates that one-third of geographical area should be under forest or tree cover this can be achieved by rehabilitating the degraded forests and by promoting the plantations forestry. Plantation forestry was initiated mainly for the production of industrial raw materials as well as fuel wood and fodder. The exotic species of *Eucalyptus*, *Casuarina* and *Acacia* are the main ones having larger area under the plantations compared to other tree species (Mohan and Manokaran, 2013).

In the natural forest, productivity is generally low due to inherent slow growth of the species and mixed composition where all species may not be valuable. One of the interesting areas of the forest department is to know the causes and mechanism of a disease outbreak. Particularly in plantation, where due to drastic changes in ecosystem, catastrophic losses may occur in the event of an outbreak of a

disease (Pathak *et al.*, 2015). A good knowledge on disease affecting the crop at their various growth phases, possible predisposing factors for the disease development and Spread and also available short-term and long-term strategies to contain the disease is warranted. Based on such knowledge, clones, provenance and Eucalyptus species can be assessed for their susceptibility to major pathogens and strategies can be devised for the production and protection of eucalyptus stand (Mohan, 2005).

The majority of plantations managed by forest department of Bastar, CG and plantation are generally located on previously cleared forest land / improved pasture land. Several private plantation companies, including investor companies, have established more than 20 ha of Eucalyptus plantation in Bastar which are not routinely surveyed for pests and disease. Disease causes the major losses in nurseries and plantation site resulting in failure of planting material and recreation of Biomass production (Mohan and Manokaran, 2013). Therefore, an attempt are made to the identify different disease problems on plantations of various trees species in Bastar forest region of Chhattisgarh.

### MATERIAL AND METHODS

Before selecting the representative plantations, a reconnaissance survey was undertaken to assess the disease

situation in plantation of *Tectona grandis*, *Eucalyptus globules* spp. and *Ochroma pyramidale*. Representative plantations with some disease potential, easy accessibility and workable terrain were selected in various regions of Bastar. The plantations site were visited during the dry period (December–April 2018) and wet period (June–July 2018) and observation recorded on disease. In each plantation, 24 plots of 20x20m, 10x10m, 25x25m, 30x30m, 15x15m, were selected. Random and alternate trees in alternate rows were paint- marked for observation. Thus, in each plot 12125 trees were observed. For information, intensive observation on certain disease of Eucalyptus such as stem canker, leaf spot , all the trees in each plots were recorded. Similarly the main diseases infecting pathogens was observed in teak plantation site and record the disease such as leaf spot, leaf blight, leaf gall , leaf brown spot, stem canker, powdery mildew etc.

## RESULTS AND DISCUSSION

The information regarding pathogenic disease of teak plantation and Eucalyptus plantation in Bastar forest area is

discussed separately and significant disease is recorded during the study. During the pathogenic disease survey in the teak plantation and Eucalyptus plantation, a total of 11 pathogenic and 2 other disease were recorded at both plantation site of study area during the year 2018, In each plantation six (06) plots of different sizes such as 20x20m, 10x10m, 30x30m, 15x15m, and 25x25m, were selected at random and alternate trees in alternate rows, painted marked for observation.

The large scale plantation are started by forest department of Bastar division. Which is 08 hectare in Titirgaon and 10 hectare area in Bastar block. The details survey of disease in teak plantation are presented in table no. 01 The Eucalyptus plantation are started by forest department, Bastar division , Chhattisgarh . Which in 06 hectare at Titirgaon and 10 hectare at Bastar block. The details survey of disease in Eucalyptus plantation are presented in table no. (03).

**Table 01:** Disease occurrence in (*Tectona grandis*) teak plantation in Bastar district (C.G)

S.No.	Host name	Name of Disease	Name of Pathogen	Disease symptoms	Remark/ Age of tree
1	<i>Tectona grandis</i>	Leaf spot	Phyllosticta tectonae	Initial the spots appeared as minute dark brown dots. The symptoms are brown to greyish brown, which develop near the tip and along the margin of the leaves.	10 year
2	<i>Tectona grandis</i>	Leaf blight	Rhizoctonia solani	The infected plants show water soaked greyish brown patches that enlarge rapidly and cover a large part or the entire lamina. The blighted leaves often show holes in the infected portion as a result of shedding of infected tissues during heavy rains.	10 year
3	<i>Tectona grandis</i>	Leaf gull	Olivea tectonae	The infected with yellowish brown fruit bodies of the fungus. The upper leaf surface presents a grey appearance due to the formation of flecks.	10 year
4	<i>Tectona grandis</i>	Leaf brown spot	Xanthomonas melhas	The symptoms are brown to greyish brown which develop near the tip and along the margin of the leaves.	10 year
5	<i>Tectona grandis</i>	Stem canker	Fusarium solani	Symptoms include swelling or sunken areas on branches and the main stem, and cracking or splitting bark.	10 year

During the disease survey in *Tectona grandis* and *Eucalyptus globules* plantation site (Titirgaon and Bastar), the common disease, their casual agents/ pathogens, disease symptoms and prescribed disease management was recorded.

It was found that the major tree disease in *Tectona grandis* is leaf spot caused by the pathogen (*Phyllosticta*

*tactonae*) in the both study site the second largest disease was stem canker found in the study site which is caused by the pathogen (*Fusarium solani*). All the important disease of teak plantation were presented in table no. (01 & 02).

**Table 02 :** Disease infection in teak plantation.

Under Teak plantation			
S. No.	Name of disease	Total infected trees due to diseases	
		Bastar	Titirgaon
1	Stem canker	27	42
2	Leaf spot	144	155
3	Leaf brown spot	7	6
4	Leaf blight	6	3
5	Leaf gull	11	14

Similarly, the pathogenic disease of *Eucalyptus spp.* (Exotic) was recorded in the both study site, the major disease of Eucalyptus spp. are leaf spot caused by the

pathogen (*Aulographina eucalypti*) in the both study site the second largest disease was stem canker found in the study

site which is caused by the pathogen (*Botryodiplodia theobromae*).

**Table 03 :** Disease occurrence Eucalyptus plantation in Bastar district (C.G)

S.No.	Host name	Name of Disease	Name of Pathogen	Disease symptoms	Remark/Age of tree
1	<i>Eucalyptus globules</i>	Stem canker	<i>Botryodiplodia theobromae</i>	It can attack all parts of the tree and is often evidenced by wilted, yellowing foliage, stunted growth, and reddish orange or brown canker on the trunk and stems or under the bark	Immediate removal of infected plants help to prevent the disease spread. Pruning, thinning coppice.
2	<i>Eucalyptus globules</i>	Collar rot	<i>Pythium splendens</i>	On Eucalyptus and A. Mearnsii the bark at the base of infected trees often crack and splits open. These include a thick mat of white mycelium under the bark of roots and collars of dead and dying trees.	Fungicidal screening against L. theobromae indicated that Bavistin (0.5% a.i) and Tecto (0.5%) were most effective Although, chemical control of disease of plantation.
3	<i>Eucalyptus globules</i>	Leaf spot	<i>Aulographina eucalypti</i>	Initial the spots appeared as minute dark brown dots. The symptoms are brown to greyish brown, which develop near the tip and along the margin of the leaves.	Immediate removal of infected plants helps to prevent the disease spread. Coppice, thinning, pruning. The disease may be controlled in the nursery by the application of sulphur based fungicide (sulfax) on both side of the leaves.
4	<i>Eucalyptus globules</i>	Leaf rust	<i>Puccinia psidii</i>	The system causing light coloured dead spots on Eucalyptus leaves.	Immediate removal of infected plants helps to prevent the disease spread. Coppice, thinning, pruning.
5	<i>Eucalyptus globules</i>	Brown leaf spot	<i>Pseudocercospora</i>	Reddish brown irregular- shaped spots with a prominent purple margin present on both sides of young, expanding leaves. Spots eventually turn dark grey.	Immediate removal of infected plants helps to prevent the disease spread. Coppice, thinning, pruning.

**Table 04 :** Disease infection in Eucalyptus plantation.

Under Eucalyptus plantation			
S. No.	Name of disease	Total infected trees due to diseases	
		Bastar (Forest Range)	Titirgaon
1	Stem canker	32	82
2	Collar rot	6	19
3	Leaf spot	166	201
4	Leaf rust	23	48
5	Brown leaf spot	25	20

Disease surveys conducted since 1997 found that most teak plantations in Peninsular Malaysia were free from root diseases. However, poor growth performance, foliage diseases and pest problems were the most common tree health problems occurring in the plantations. These were the major problems faced by the farmers mainly in the first phase of the plantation establishment. The majority of the problematic plantations were found to be generally linked to species-site in tolerance, improper planting techniques and poor silviculture management. Those trees exhibiting poor growth were frequently observed to possess underdeveloped and coiling root systems in the planting hole (Farid *et al.*, 2005).

## CONCLUSION

The study revealed that the several leaf disease of *Tectona grandish* and *Eucalyptus globules* in the plantation, site of Bastar forest division (C.G.) The casual organism in teak pathogens are, *Pylosticta tectonae*, *Rhizoctonia solani*, *Olivea tectonae*, *Xenthomoas methas*, *Fusarium solani*, *Phyllactinia corvlea* etc. were found. These are responsible to diseases like leaf spot, leaf blight, leaf gull, leaf brown spot, stem canker, powdery mildew etc. and affecting the growth and form of teak. Similarly the main diseases infecting pathogens were found in Eucalyptus plantation ,

these are *Botryodiplodia theobromae*, *Pythium splendens*, *Aulographina eucalypti*, *Puccinia psidii*, *Pseudocercospora*, which caused stem canker, collar rot, leaf spot, leaf rust, brown leaf spot, disease and affecting the growth and from of Eucalyptus.

The infection was obviously visible as indicated by bark depression, rotting at the root collar, wider canopy gap and frequent presence of woodborers at the rotted portions. Below ground symptoms while present even during early stages of the disease are, however, only detectable upon excavation which involves extensive labour. Pathogenicity tests revealed that the fungus did not require the presence of wounds to invade and subsequently kill the host plant. Further studies are required for early detection and diagnosis of the disease to prevent or reduce the spread of the disease. The symptoms of teak was leaf spot, dark brown dots, brown patches the blighted leaves often show holes in the infected portion, stem canker symptoms was include swelling or sunken areas on branches and the main stem ,and cracking or splitting bark, powdery mildew symptoms on teak white, powdery growth occurs in patches on upper leaf surfaces. The patches later coalesce, leading to drying of the leaves. The major symptoms of Eucalyptus stem canker, collar rot, leaf spot, leaf rust, brown leaf spot, was the reddish orange or brown canker on the trunk and stems or under the bark, collar rot symptoms the trees base of infected often crackes and splits open were found .

The pathogens cause significant damage in various trees plantation. The present survey are useful to understand about infecting organism in teak and Eucalyptus plantation to the forester.

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