

## SOME PATHOLOGICAL ASPECTS OF *EUCALYPTUS* SPECIES FROM KHAMMAM DISTRICT, TELANGANA

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*Eucalyptus* has gained importance in agro forestry in view of its wide ecological adaptations. There are more than 42 pathogenic fungi associated with plantations of *Eucalyptus*. In the present study a survey (2018-2019) of diseases associated with *Eucalyptus teriticorns* Smith and *Eucalyptus camaludutensis* Dehnh, was undertaken. However, it is interesting to note that these diseases are mostly confined to Khammam districts where huge plantations are found under the control of Badhrachalam paperboard. Further, this paper reports, the first report of *Cylindrocladium parvum* Anderson and *Glomerella cingulata* (Stonem.) Spauld and V. Schrenk from India and Telangana.

**Keywords:** Diseases, Eucalyptus, Khammam, Pathogens, Plantation,

Plantation forestry of *Eucalyptus* Species and clones has been practiced in India since 1990. Number of pathogens causing diseases on *Eucalyptus* have been reported from India from time to time ( Bakshi, 1976, Sharma and Mohanan 1982, and Sharma *et al.* 1984 and Tiwari (1992). Around 42 pathogenic fungi have been reported on *Eucalyptus teriticornis* and *Eucalyptus camaludutensis*, respectively. It has been observed that along with increase of *Eucalyptus* plantations and clones, it is likely that disease problems will also increase and may require their control. Therefore, a survey (2018-2019) has been undertaken to identify pathogenic fungi associated with *Eucalyptus teriticornis* and *Eucalyptus camaludutensis* plantations and clones in and around Khammam, Telangana State, India. All the 42 pathogenic fungi reported earlier have also been found in this survey, but for two new diseases caused by *Cylindrocladium parvum* and *Glomerella cingulata*.

A survey of literature indicates that these two diseases are the first reports from India and Telangana and are found damaging heavily the *Eucalyptus* plantations.

### MATERIALS AND METHODS

Periodic surveys of diseases occurring on the

plantations and clones of *Eucalyptus teriticornis* and *Eucalyptus camaludutensis* are conducted in and around Khammam district in the year 2018 -2019. Hot summer and normal monsoon rainfall are associated with the area of study. The annual rainfall ranges from 800 to 1000 mm, which is mostly from south west monsoon. The average winter temperature is around 20<sup>o</sup>c and summer being 45<sup>o</sup>c, hence the climate being hot and dry. The relative humidity goes down during summer. The soil type is of alluvial all along the river Godavari and uplands are red soil.

### ISOLATION OF PATHOGEN

The disease symptoms were recorded carefully, screened and numbered as per CABI pattern. The diseased samples were observed immediately after bringing them from the field site. The disease symptoms were noted both on the plantations and clones. Leaves with distinct water soaked lesions and necrosis as well as wilted shoots and also damaged roots were collected and plated them on different nutrient Agar media after surface sterilization with ethyl alcohol and sterile distilled water. The inoculated Petri plates were incubated at 30<sup>o</sup>c for 4 to 7 days. Single spore pure cultures were raised. The fungi were identified with the help of standard monographs (Ellis 1971, 1976)

## Pathogenicity Test

The pathogens isolated were tested for fulfilling Koch's postulates. Pathogenicity tests were conducted on healthy leaves, shoots and roots and later on they were observed after a week. All the inoculated plant parts have shown the disease symptoms similar to that of field conditions (Figure 1)

## RESULTS AND DISCUSSION

A total of 532 isolates of 12 pathogenic fungi were isolated from diseased specimens of *Eucalyptus teriticorns* and *Eucalyptus camaludutensis* from Khammam and its surrounding areas during 2018 and 2019 (Table 1)

Most of the pathogenic fungi belong to *Alternaria*, *Curvularia*, *Cylindrocladium*, *Glomerella*, *Drechslera*, and *Pestalotiopsis*.

Among these *Cylindrocladium parvum* and *Glomerella cingulata* have been recorded for the first time on *Eucalyptus* plantations from India and also from Telangana (Sankaran *et al.* 1995). Therefore these two have been worked out in detail.

1. *Cylindrocladium parvum* P.J. Anderson

(Figures 2,3, & 4)

Disease is characterized by damping off, seedling blight, stem infection, branch infection and leaf lesions. Damping off is usually found in seedlings of nurseries. The infection on the stem results in blight occurring on the parts near to the ground. Stem infection is found in plants which are one month old. The infection occurs on the lower half of the plant leaf. The affected plants show wilting and finally die. Branch infection was observed in branches of matured trees which later becomes canker. Leaf spots are observed both in nurseries and plantations. The initial symptoms on leaves being large greyish black irregular spots resulting in defoliation. The pathogenic fungus has been identified as *Cylindrocladium parvum* whose perfect stage is *Calonectria parvum*. The fungus produces penicillate conidiophores. Conidia are one septate, cylindrical, measuring 9.9-14 x 2 to 2.5  $\mu$ m. Sterile filaments measure around 74.0 to 106.0 x 1.6-2.3  $\mu$ m terminating into a clavate or spatulate vesicle measuring 9.9-33.5 x 4.9 – 9.9  $\mu$ m.

2. *Glomerella cingulata* (Stonem) Spauld and V. Shrenk (Figures 5 & 6)

The fungus causes anthracnose disease which is

**Table 1:**

		* Isolation Frequency, %	
		Nursery	Field
	Oomycota		
1	<i>Phytophthora cinnamomi</i> Ascomycota	0	3.67
2	<i>Glomerella cingulata</i> Basidiomycota	9.46	11.93
3.	<i>Armillaria mellea</i>	0	2.75
4.	<i>Corticium salmonicolor</i> Deuteromycota	0	4.59
5.	<i>Cylindrocladium parvum</i>	41.84	16.51
6.	<i>Pestalotiopsis versicolor</i>	14.42	7.34
7.	<i>Curvularia lunata</i>	14.18	5.5
8.	<i>Alternaria alternate</i>	9.22	13.76
9.	<i>Chaetomella raphigera</i>	4.02	12.84
10.	<i>Drechslera hawaiiensis</i>	0.71	0
11.	<i>Fusarium dimerum</i>	0	16.51
	<b>Unidentified Fungi</b>		
12	Sterile mycelium	6.15	4.59

\* Percentage isolation is based on 423 isolations from nursery plants and 110 isolations from field plantations.

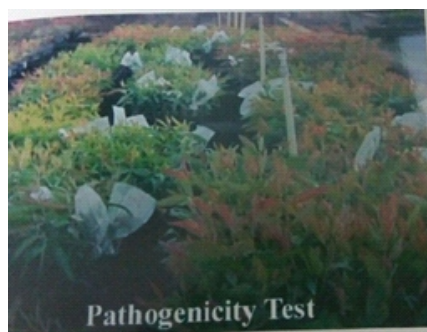


Figure: 1



Figure: 2

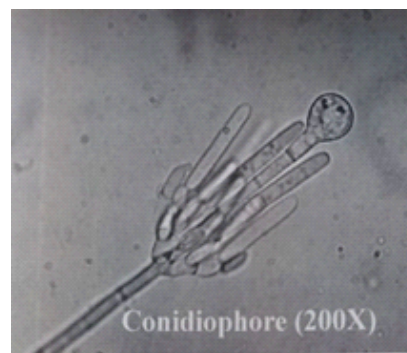


Figure: 3



Figure: 4



Figure: 5



Figure: 6

characterized by leaf spots, blossom blight and mostly young leaves are susceptible to the infection. The spots are irregular, light brown in color and marginal spots are light brown to dark brown. Each infection spot is surrounded by black pin head like fruit bodies present on the spot. The fungus has been identified as *Glomerella cingulata*. The fungus produces dark perithecia either in groups or separately. Conidia are seen in acervuli/sporodochia. Conidia are produced on solitary phialades and are light or brown in color being in sporodochia/acervuli. A basal stromatic cushion is colored with a dense layer of cylindrical or tapering phialades measuring up to 20  $\mu\text{m}$  long. Conidia cylindrical with a rounded apex and bear slightly truncated base. Conidia are hyaline, filled with granular cytoplasm measuring 10-21 x 4-6  $\mu\text{m}$ , looking like orange-red slimy masses. Ascospores mostly present in the natural habitat, measuring 85 to 300  $\mu\text{m}$  in diameter with dark ellipsoidal ascospores, smooth walled, measuring 10-21 x 4-6  $\mu\text{m}$ . The pathogenicity has been established

as per Koch's postulates.

*Cylindrocladium* disease is controlled by spraying carbendazim 0.2%, benomyl or ketazin 0.2% at weekly intervals besides growing resistant clones. *Glomerella* disease can be controlled with Bordeaux mixture or copper oxychloride at 0.2% by spraying at an interval of 14 days. In some parts of the country Zineb or Captan are also sprayed. Both the diseases described above are known to occur on *Eucalyptus camaldulensis* and *Eucalyptus tereticornis*, respectively. The literature survey shows that the above two described diseases are not only new to Telangana but also to India. The author is thankful to NASI, Allahabad India for their encouragement.

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