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DIVERSITY OF ENDOPHYTIC FUNGI IN ASSOCIATION WITH TERMINALIA TOMENTOSA IN ACHANAKMAR TIGER RESERVE OF CHHATTISGARH

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ABSTRACT

Endophytic fungi are potential sources of novel natural agents for exploitation in the pharmaceutical industry, agriculture and in environment applications. The present study focused on the isolation and identification of Endophytic fungi of leaf of *Terminalia tomentosa* Roxb. belonging to family Combretaceae from Achanakmar Tiger Reserve of Chhattisgarh. The plants have various activities like antifungal, antioxidant, antimicrobial, etc. Endophytic fungi have proven their usefulness for drug discovery, as suggested by the structural complexity and chemical diversity of their secondary metabolites. About 12 endophytic fungi were isolated and identified from the leaves of *Terminalia tomentosa*. These isolated endophytic fungi are belonging to the genera of *Alternaria*, *Mucor*, *Curvularia*, *Aspergillus*. In this study, the majority of fungi are *Mycelia sterilia*. However, further studies are required to screen these endophytic fungi for the production of novel bioactive compounds.

KEYWORDS: *Terminalia tomentosa,* Endophytic fungi, Bioactive compounds, Secondary metabolites, Achanakmar Tiger Reserve, Chhattisgarh.

INTRODUCTION

Terminalia tomentosa is a deciduous tree having 30m height belonging to family Combretaceae and is commonly found in Achanakmar Tiger Reserve of Chhattisgarh. The tree is being used as a traditional medicine by the baiga tribes of the reserve. The leaves of *Terminalia tomentosa* are simple, sub opposite or upper most alternate, thick coriaceous, ovate, oblong, softly when young & more or less glabrous when mature. *Terminalia arjuna* Weight and Arn., an important ethnopharmacological plant extensively used in Ayurvedic

medicines to treat heart ailments in India were studied for their endophytic fungal assemblages of inner bark and twigs (Tejasvi et al; 2005).

Achanakmar is quite rich in flora and fauna. Endophytes are symbiotic fungi that receive shelter and nutrients from their host, while the host plant benefits from an array of attributes, including defense against natural enemies such as pathogens and herbivores (Arnold et al, 2001). Fungal endophytes inhabit host tissues in different organs, including leaves, stems, bark, roots, fruits, flowers and seeds.

Suryanarayanan and Rajagopal (1998) reported that endophytic fungi are known to produce compounds that interfere with plant cell division. Endophytes have recently been shown to be key element in plant symbiosis, affecting host tolerance in stressful conditions (Redman et al, 2002; Robrigues et al, 2004; Marquez et al, 2007). The diversity and frequency of endophytic fungi population are greatly affected by the climatic condition and the location of where host plant grows (Leibold et al, 2004). Proof of principal was realized when the anticancer drug taxol was found to be produce by endophytic fungi isolated from *Taxus brevifolia* (Strobel et al, 1996).

Achanakmar Tiger Reserve is one of the threatened hot spots of biodiversity in the world. This is located in Central part of India at the elevation range 383 – 800 m above sea level. The Reserve has an area of 552 sq km. lies between latitude 22◦15 to 22◦58 and longitude 81◦25 to 82◦5 in Mungeli district of Chhattisgarh. This is an important site of Bilaspur of which natural vegetation varies from place to place. The reason behind host plant selection include to investigate plants that are used in traditional medicine for the treatment of infections and to identify the endophytes found in different parts of those plant. Endophytic fungi are a group of fungi which reside within the living tissue of the host without causing any disease or disease like symptoms. The resurgence of research on fungal endophytes is due to the fact that this group of fungi represent potential source of novel bio chemicals, some of which are agriculture and pharmaceutical importance. The rapid rate of growth, decomposition and nutrient cycling that exist in the state also suggests that endophytes have to face ecological challenges such as rigorous competition for a limited resource. Therefore, this study will be conducted for preliminary research on endophytes of tree species. Some Endophytic fungi have been found to produce similar medicinal compound to that of the host (kharwar et al 2011).

MATERIAL AND METHOD

The mature and healthy leaves of tree species *Terminalia tomentosa* was collected from Achanakmar Tiger Reserve. 4 - 6 mature and fresh green leaf was collected from tree. The leaves was washed thoroughly in running water and 3 - 6 segments of 0.5 cm was cut from midrib portion of each leaf. Surface sterilization of 70 % ethanol followed by 4 % NaOcl. 4 - 6 bits was placed in one sterile petridishes containing Potato Dextrose Agar (PDA). Sealed plated was incubated in a light chamber at 25^0C for 2 weeks. Highly sterile conditions were maintained for the isolation of endophytes.

The fungi that grew out from the segment was periodically isolated and identified. The endophytes isolated was maintained in PDA slants in culture collection in our department.

RESULT AND DISCUSSION

Endophytes are rich source of natural products displaying broad spectrum of biological activities. The endophytic fungi isolates were identified up to the genus level based on the morphological features such as colony, morphology, growth pattern, spore structure and other hyphal characteristics. The microscopic examination was also done to study their reproductive spores. About 12 endophytic fungi are isolated and identified from the leaves of *Terminalia tomentosa*. These isolated endophytic fungi are belonging to the genera of *Alternaria*, *Mucor*, *Curvularia*, *Penicillinum*, *Aspergillus* etc. Some fungi which did not produce any reproductive structure, as they produced sterile mycelia come under the category of *Mycelia sterilia*.

Table – Endophytic fungi isolated from different types of leaves of *Terminalia tomentosa* plant.

S. No.	Endophytic fungi	Young leaf	Mature leaf	Old leaf
1.	*Acremonium* sp.	+	+	-
2.	*Aspergillus flavus*	+	+	-
3.	*Curvularia* sp.	+	-	-
4.	*Clamydospores* sp.	+	+	+
5.	*Colletotrichum* sp.	-	+	+
6.	*Nigrospora* sp.	-	-	+
7.	*Penicillinum* sp.	+	+	+

This study was carried out for the isolation and identification of endophytic fungi from Achanakmar Tiger Reserve of Chhattisgarh. In the study, 12 endophytic fungi were isolated from the midrib portion of leaves of *Terminalia* plant. Some fungi which are isolated from

the host plant are *Colletotrichum, Archimonium, Corynespora, Clamydospores, Fusarium, Aquilaria* etc.

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