Mycoendophytic Diversity Associated with Ethanomedicinal plants *Ficus pumila* Linn and *Mirabilis jalapa* Linn.

**Dr. S.Satish**

Department of Studies in Microbiology  
University of Mysore  
Manasagangotri  
Mysore, 570 006  
Karnataka, India  
Ph:+91-821-2419734 (O)  
+91-9448323129 (M)  
e-mail: satish.micro@gmail.com

**Visiting Scholar**  
Department of Plant Pathology  
University of Georgia  
Athens 30602, USA  
Ph:+1-706-715-1643 (M)  
e-mail: satish@uga.edu
**Endophytes**

Endophytes are the microbes that colonize living, internal tissues of plants without causing any immediate, overt negative effects.

**Significance of endophytic Diversity**

- Endophytic mycobiome forms a significant part of the microbial diversity.
- Endophytes comprise a large hidden component of fungal biodiversity (Arnold, 2007 and Rodriguez *et al.*, 2009).
- Taxol (Plaxitaxel): Produced by *Taxomyces andreanae*, endophytic fungus from *Taxus brevifolia*

Unexplored or untapped source of novel bioactive metabolites.

- Diverse biological activity due their unprecedented structural diversity (antibacterial, antifungal, antitumoral, antiviral, antioxidant, immunosuppressor, insecticide) (Strobel *et al.*, 2004)
Endophytic fungi inhabit almost all variety of plant species. The diversity of fungal endophytes mainly depends on the type of plant species and geographical area. Plants with ethno botanical history form important criteria towards screening of endophytes which may lead to isolate endophyte with potent activity and few of the scientific reports suggests that plants growing in rich biodiversity lodge diverse group of endophytes with activity.
Plant-associated microorganisms, especially endophytic fungi are largely underexplored in the discovery of natural products (Strobel and Daisy, 2003; Gunatilaka et al., 2006)
Medicinal plants selected for the isolation of endophytic fungi

**Figure:** Habit of *Mirabilis jalapa* Linn.
*Botanical Name:* *Mirabilis jalapa* Linn.
*Family:* Nyctaginaceae (Bougainvillea family)
*Common name:* Four O’ clock plant, Beauty-of-the-night, Marvel of Peru, Gulamaji (Local Native Name)

**Figure:** Habit of *Ficus pumila* Linn.
*Botanical Name:* *Ficus pumila* Linn.
*Family:* Moraceae (Mulberry family)
*Common name:* Creeping fig
Aim of the present investigation

- Plant materials of *Ficus pumila* and *Mirabilis jalapa* were collected during 2010-2011 in three different seasons: summer, monsoon, and winter in Mysore, Karnataka.

- Isolation of endophytic fungi was carried out according to the procedure of Schulz *et al.*, (2003).

- Identification of endophytic fungi was carried out based on macroscopic and microscopic observations, following standard manuals (Gilman 1956; Wei, 1979; Sutton, 1980; Barnett and Hunter, 1998; Leslie and Summerelle, 2006) with some morphospecies (*Xylaria*) being identified by Molecular technique using PCR.

- To assess and quantify endophytic fungal diversity between two host plants, following diversity indices were used:
  - Colonization rate (CR) (Photita *et al.*, 2001)
  - Isolation rate (IR) (Maheshwari and Rajagopal, 2013)
  - Colonization frequency (CF) (Hata and Futai, 1995)
Fig: Overview of the procedure of isolation, cultivation and identification of endophyte fungi
Results

- **3 Ascomycetes genera:** Chaetomium sp., Sporomia sp. and Xylaria sp. (10.92%),
- **5 Coelomycetes genera:** Colletotrichum sp., Pestalotiopsis sp., Phoma sp., Phomopsis sp. and Phyllosticta sp. (18.06%),
- **11 Hyphomycetes genera:** Acremomium sp., Alternaria sp., Aspergillus sp., Cladosporium sp., Curvularia sp., Drechslera sp., Fusarium sp., Myrothecium sp., Nigrospora sp., Penicillium sp. and Trichoderma sp. (55.46%)
- **2 Zygomycetes genera:** Mucor sp. and Rhizopus sp. (2.94%),
- **2 Morphospecies of Mycelia sterilia** (8.4%).
Colonization and isolation rates

- 99 segments (50.51%) of the stem and 97 segments of (49.48%) leaf were colonized with endophytic fungi from both the plants.

- Colonization rates (%) of endophytic fungi for both the tissues were found to be relatively homogeneous (14.33% and 14.0%) and (18.66% and 18.33%) for *Mirabilis jalapa* and *Ficus pumila* (Table 1 and 2).

- Isolation rates of endophytic fungi in leaves of both plants were relative high when compared to stem in both plants, endophytic fungal isolates were prevalent on leaf tissue of plants (52.94%) than on stem tissue (47.0%) (Table 1 and 2).
Colonization frequency

Aspergillus flavus and Xylaria sp., are dominant endophytic fungal genera in leaf while in stem species of Fusarium and Pestalotiopsis were dominant in Mirabilis jalapa and Ficus pumila respectively.

Dominance and species richness

- Despite the similar patterns of species accumulation, endophytes segregated with varying degree of colonization during three sampling season among different tissues of the two hosts.

- Overall diversity indices values for foliar endophytes of Ficus pumila was relatively high when compared to leaf and stem tissues of Mirabilis jalapa.

- But species richness was higher in stems of Mirabilis jalapa when compared with leaves and stems of Ficus pumila due the isolation 19 different endophytic fungal taxa.
Cultural, Morphological and microscopic Characteristics of Major endophytic fungal genera isolated in the present study

- **Cladosporium sp.**
- **Colletotrichum sp.**
- **Curvularia sp. 1**
- **Curvularia sp. 2**
- **Dreschlera sp.**
- **Fusarium sp. 1**