

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

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Endophytes

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

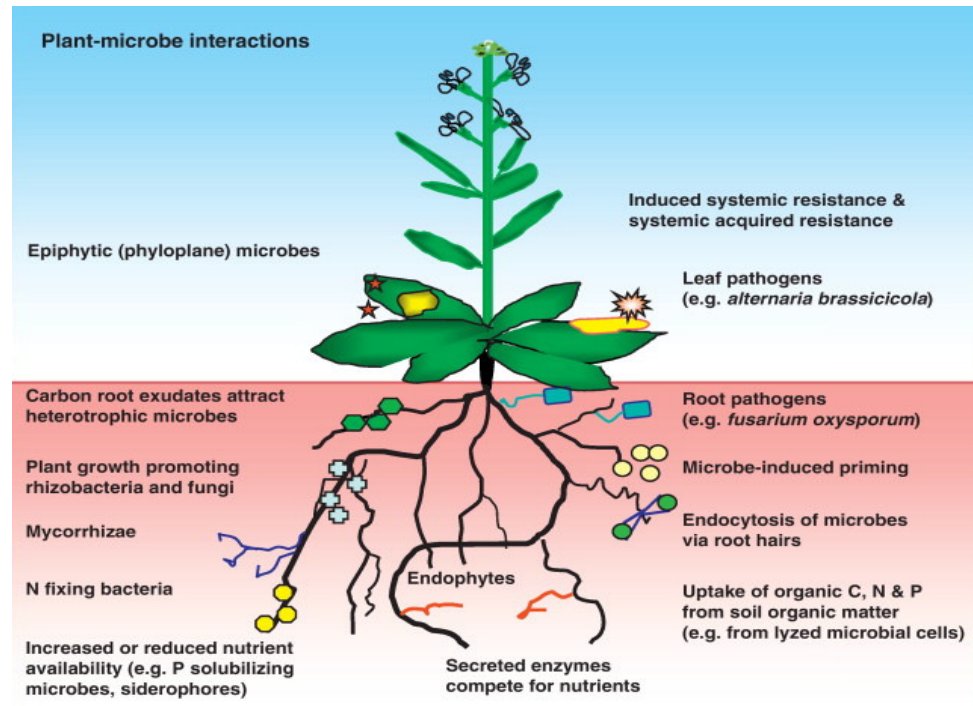
Significance of endophytic Diversity

- 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)

Fungal diversity



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 collection

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

Isolation of endophytes

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

Identification of endophytes

- Identification of endophytic fungi was carried out based on the 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*) were identified by Molecular technique using PCR.

Data analyses

- 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)

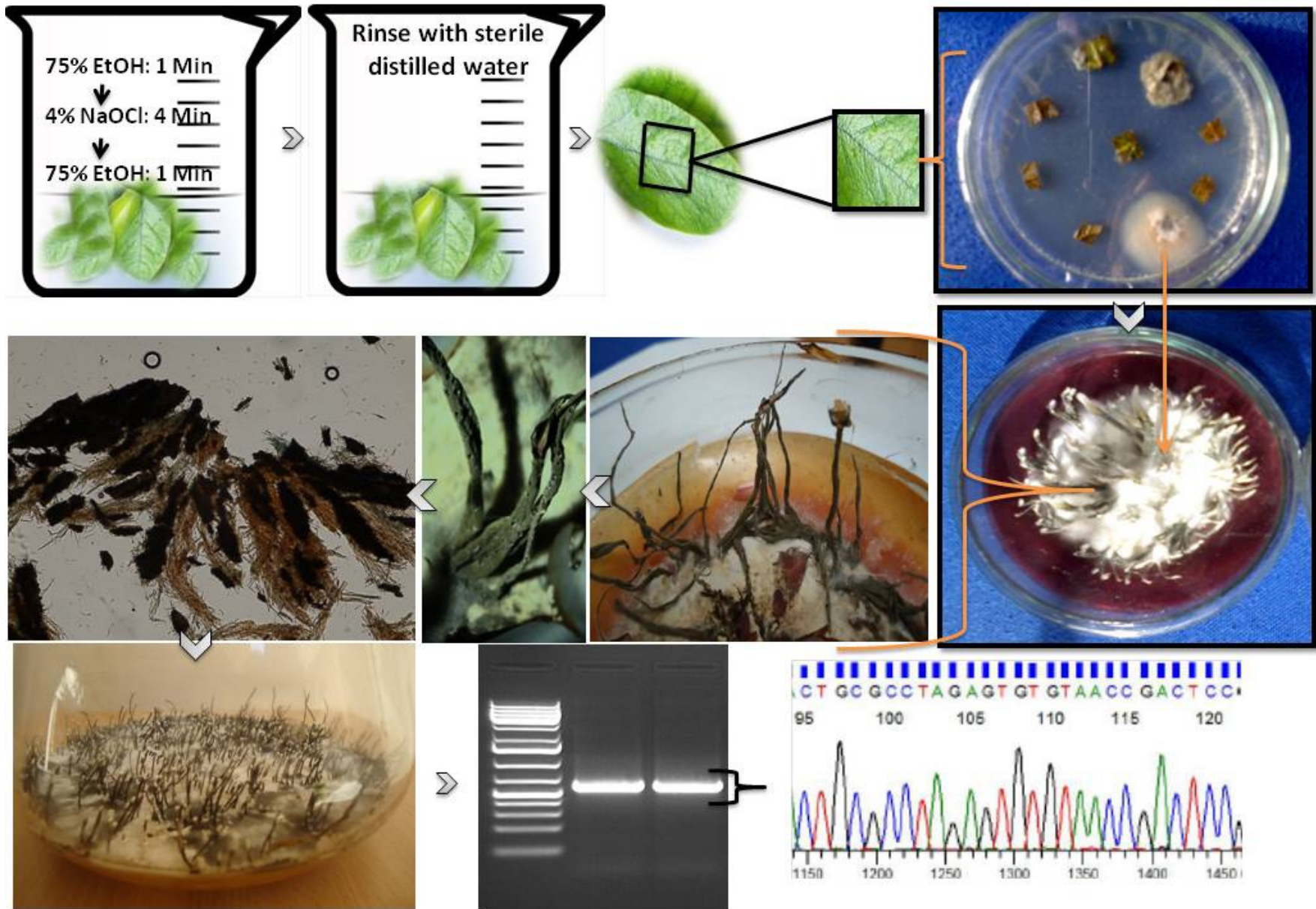
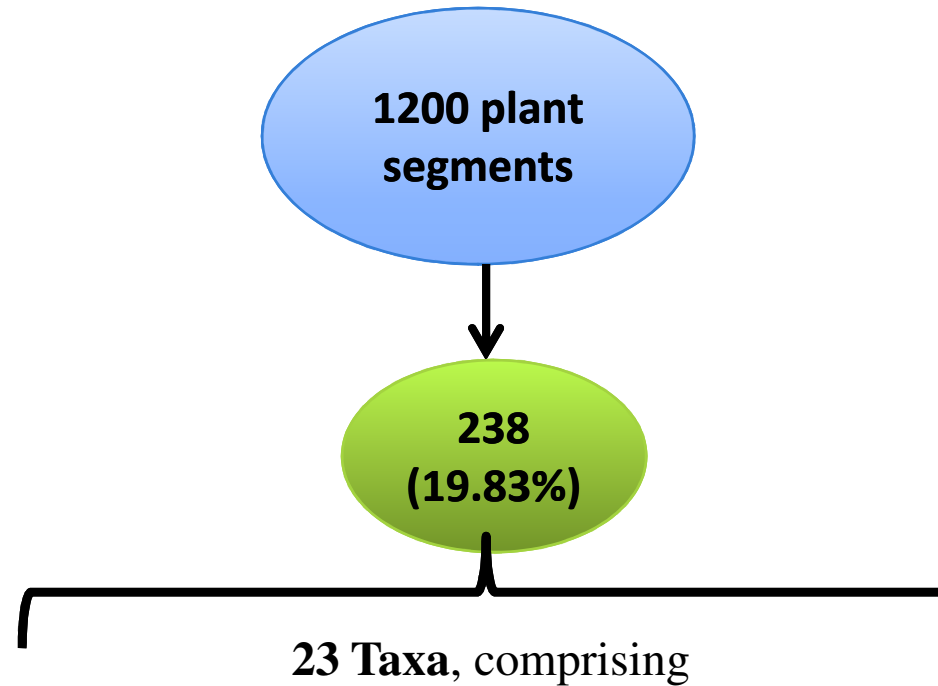


Fig: Overview of the procedure of isolation, cultivation and identification of endophyte fungus

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:** *Acremomyces* 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).

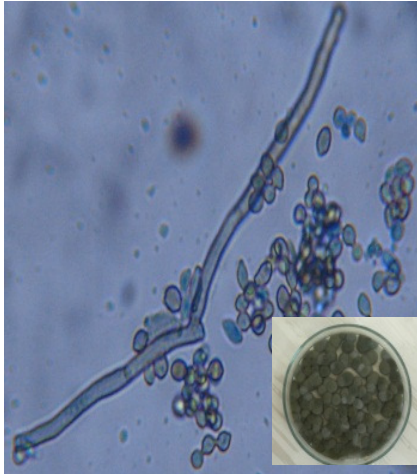
Colonization frequency

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.

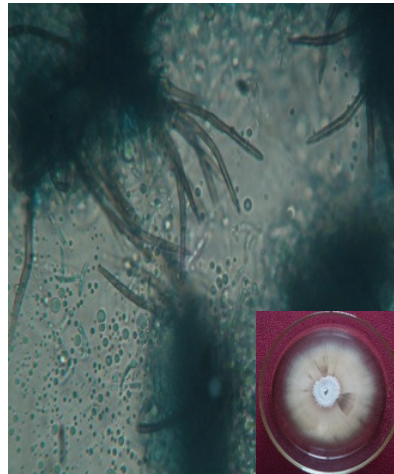
Dominance and species richness

- ❖ 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.

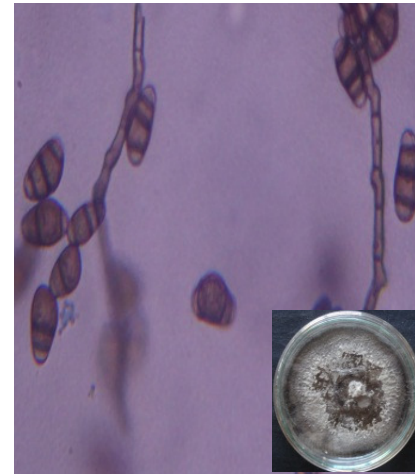
Cultural , Morphological and microscopic Characteristics of Major endophytic fungal genera isolated in the present study



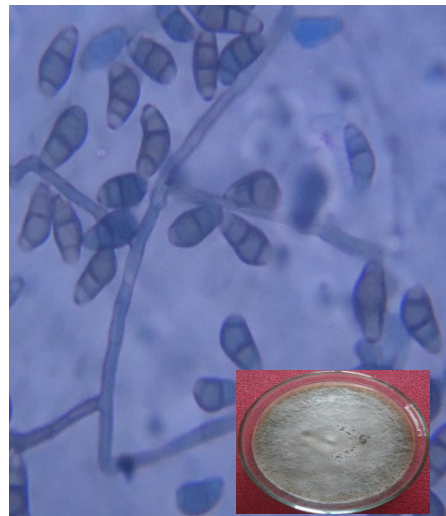
Cladosporium sp.



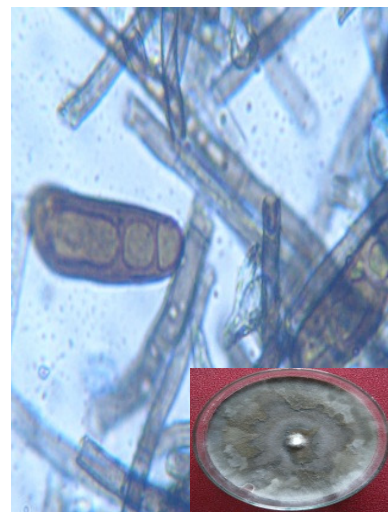
Colletotrichum sp.



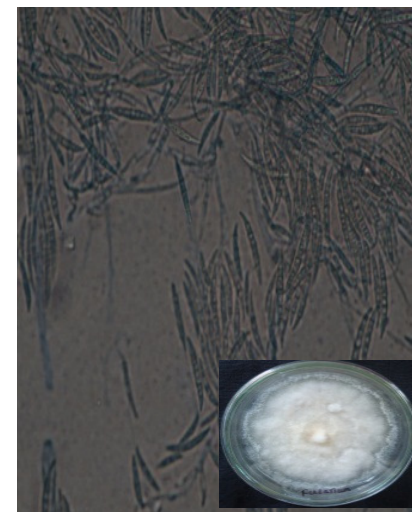
Curvularia sp. 1



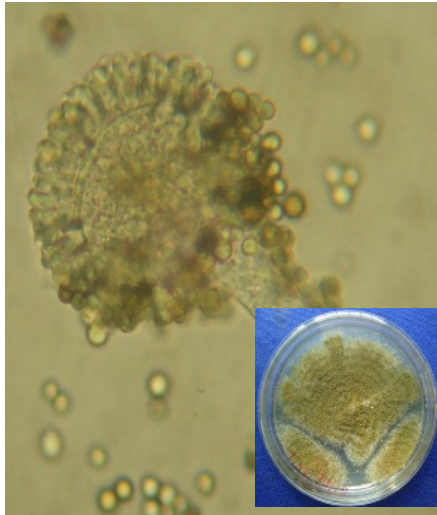
Curvularia sp. 2



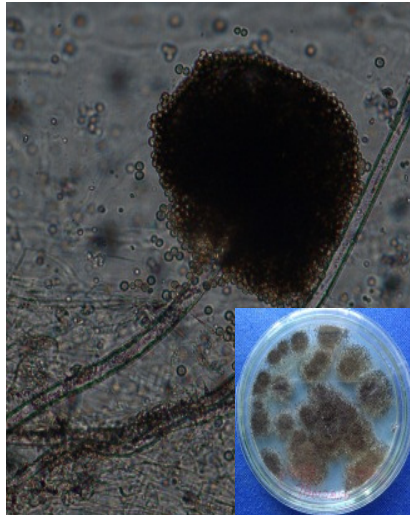
Dreschlera sp.



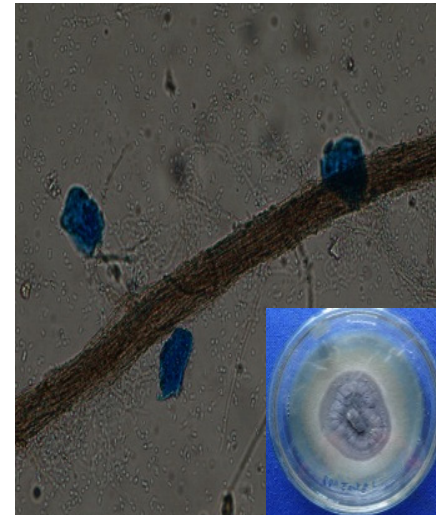
Fusarium sp. 1



A. flavus



A. niger



Acermonium sp.



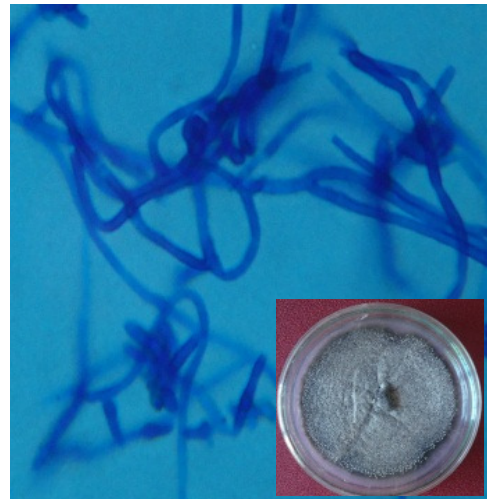
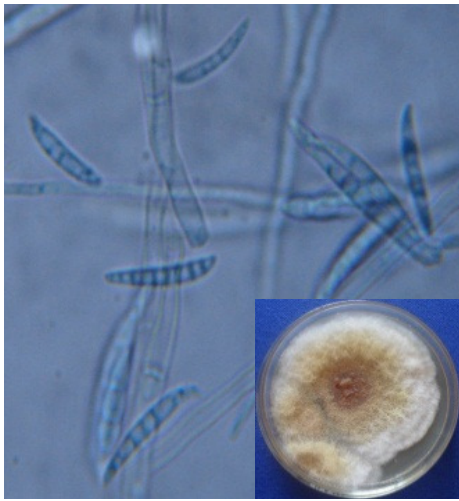
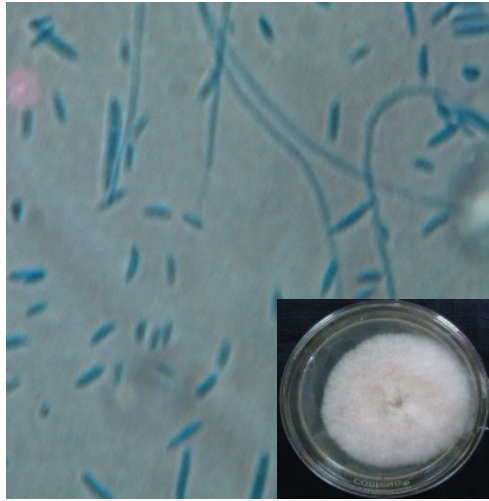
Alternaria sp.



Chaetomium sp. 1



Chaetomium sp. 2



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