Diversity of Epigeous Ectomycorrhizal Fungi in the
Campus of Swami Ramanand Teerth Marathwada
University Nanded, Maharashtra

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Abstract: Present study deals with the evaluation of diversity of Ectomycorrhizal fungi (ECM) are themutually associated with the higher plants mainly grasses. All the fungal species were collected from S.R.T.M. University Campus. (19°06'00.3"N, 77°17'15.6"E) in Monsoon period month of June to November 2014. The fungal species samples wereisolated by the smallpileus tissue of basidiocarps and spore print method. In all 08 Ectomycorrhizal samples were identified up to species level and 03 up to generic level. The genus Termitomyces heimiand Termitomyces clypeatus are the most dominant in the collected samples.

Keywords: Ectomycorrhiza (ECM), Fungi, Diversity

1. Introduction

The word ‘Mycorrhiza’ is the combination of two Greek words ‘Mykes’ means ‘Fungus’ and ‘Rhiza’ means ‘Root’ i.e. ‘Fungal Root’. The ‘Mycorrhiza’ word firstly introduced by the German Forest Pathologist A. B. Frank in 1885. But the work on mycorrhiza was started in India by B. K. Bakshin early sixties when practically having lack of information about mycorrhiza. Mycorrhiza is mutually association with roots of woody vascular plants and mycelium of nonpathogenic soil fungi. Generally mycorrhiza have classified under the two main groups on the basis of morphological and anatomical structural features, i.e. endomycorrhiza and ectomycorrhiza. In early days, the latest classification of mycorrhizae has seven groups i.e. Ectomycorrhizae (ECM), Vescular Arbascular (VAM), Ectoendomycorrhizae, Arbutoidmycorrhizae, Ericoid mycorrhizae, Monotropoidmycorrhizae, and Orchid mycorrhizae.

Important of Ectomycorrhizae

Ectomycorrhizae is generally beneficially associated with temperate and boreal forest trees. But it is also found in tropical region like Maharashtra during the monsoon period. Most of the ECM fungi (about over 5,000) belonging to Ascomycetes and Basidiomycetes which are beneficial associated with about 2,000 woody perennial plants and grass. The complicated network of mycelium of fungus that goes into the roots of host cell wall and hyphae entered in the root epidermal or cortical root cells known as Harting net. Ectomycorrhiza is only type of the mycorrhiza which are the absence of intracellular penetration. They only capable to produce the intercellular penetration when the nutritional balance disturbed of the associated host. This connection of ectomycorrhiza fungus and plants are very important for essential nutrients exchange between them. In this association both the partners are beneficial because fungi get carbohydrates from plants and fungi provides water, mineral, salts and metabolites to the plant.

Ectomycorrhizae helps in mobilization of nutrients mainly water, nitrogen, phosphorus etc. It plays dominant role in enhance the growth and development of plant and also they help tremendously in increase the productivity of soil. Ectomycorrhiza make easy provide water and nutrients from soil which are unable to absorb by the nonmycorrhizal roots of higher plants. They help in nutrient solubilization and minerals cycling especially carbon and nitrogen cycling which are very important for the plant as well as for forest ecosystem. They are important for degrade the cellulose and hemicelluloses. The present study aimed to evaluate the diversity of ECM from the selected area of Swami Ramanand Teerth Marathwada University Campus, is located in Nanded district of Maharashtra (19°06'00.3"N 77°17'15.6"E) occupied approximately 525 acres area. Number of plants species belonging to both monocots and dicots have shown Ectomycorrhizal association.

2. Materials and Methods

Samples Collection

The fungal collection have done in the S.R.T.M. University campus (Figure 01) by hand picking method with the help of clean, sterilized polythene, basket and shovel etc. Dig out the samples safely in a matter that the ectomycorrhiza or connection in between the ectomycorrhizal hyphae with their root of host did not damaged and brought to the laboratory for further analysis and processed immediately.
Spore Print, Preparation and Isolation of Pure Culture

These collected samples were isolated from the spore print technique. For collecting the spores, cut the cap from the stalk of fresh, well cleaned fungal sample place it spore side down on the white or black hard paper or the clean sterilized petri plate and covered it bowl or beaker to prevent the disturbance from the air or any other things. After the couples of hours the spores fall down on the paper or petri plates which are useful to kept or inoculated on the semi synthetic media i.e. MMN media, PDA media, Czapek dox media.

Another general method used that cutting small tissue of basidiocarps, surface sterilized and kept on the media and maintain on it. After the 3-4 days the growth of fungal colonies started appearing on the plate observed and record it on notebook.[8, 17].

Staining and Mounting

Lactophenol cotton blue used for staining to observe the basidiospore and basidium [9]. These fungus were observed under the light microscope and micro photographed by Digi Eye Camera fitted with to OLYMPUS CX 21 bright field light microscope.

Identification of the Fungi

Identification was done by using morphological characters, thallus structure and spore characters considered as diagnostic feature for identification and these morphological structures were identified by the standard taxonomic key given by Ainsworth and some other books and various research articles.

Table 1: The identified ectomycorrhizal fungi associated with their host

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Ectomycorrhizal species</th>
<th>Host</th>
<th>BG</th>
<th>LA</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>01)</td>
<td>Termitomyces heimiti Nat.</td>
<td>Azadirachta indica</td>
<td>15</td>
<td>07</td>
<td>02</td>
</tr>
<tr>
<td>02)</td>
<td>Termitomyces clypeatus Heim.</td>
<td>Grass/ Peltophorum ferrugineum</td>
<td>07</td>
<td>06</td>
<td>01</td>
</tr>
<tr>
<td>03)</td>
<td>Coprinus spicatilis</td>
<td>Cynodon dactylon</td>
<td>07</td>
<td>02</td>
<td>06</td>
</tr>
<tr>
<td>04)</td>
<td>Galerina spp.</td>
<td>Peltophorum ferrugineum</td>
<td>09</td>
<td>-</td>
<td>01</td>
</tr>
<tr>
<td>05)</td>
<td>Agaricus arvensis</td>
<td>Euphorbia spp.</td>
<td>01</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>06)</td>
<td>Paneloepespp.</td>
<td>Grass ssp.</td>
<td>-</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>07)</td>
<td>Cordiceppsspp.</td>
<td>Grass ssp.</td>
<td>-</td>
<td>-</td>
<td>01</td>
</tr>
<tr>
<td>08)</td>
<td>Volvariellabomytsiavana (Schaeff.) Singer</td>
<td>Jatropha spp.</td>
<td>02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>09)</td>
<td>Volvariellabomytsiavananar. flavicepsv (Murrill) Shafer.</td>
<td>Jatropha spp.</td>
<td>01</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10)</td>
<td>Agaricus placomyces Peck.</td>
<td>Grass ssp.</td>
<td>-</td>
<td>05</td>
<td>-</td>
</tr>
<tr>
<td>11)</td>
<td>Macrolepiota procera (Scop.) Singer.</td>
<td>Grass ssp.</td>
<td>02</td>
<td>01</td>
<td>-</td>
</tr>
</tbody>
</table>

3. Result

Present study deals with to explore the diversity of Ectomycorrhizal fungi. There are 11 different ectomycorrhizal fungal species are collected from selected area in which 08 species identified up to species level and 03 species up to genera level. Table 1: clearly shows that *Termitomyces ssp.* is the more dominant fungal species as compare to other species. It is observe in all the selected sites.

![Figure 3: Fruiting bodies of ectomycorrhiza fungi](image)

*Figure 3: Fruiting bodies of ectomycorrhiza fungi*

a) *Termitomyces clveatus*  b) *Termitomyces heimnitz*  c) *Galerina spp.*  d) *Coprinus plicatilis*  e) *Agaricus arvensis*  f) *Macrolepiota procera*  g) *Agaricus placomyces*  h) *Cordiceps spp.*  i) *Panuelopes spp.*  j) *Volvariella bomybsiyana var. flaviceps*  k) *Volvariella bomybsiyana*

4. Conclusion

The result of this research experiments showed that explore the diversity of epigeous ectomycorrhiza in S.R.T.M. University campus. Ectomycorrhiza is the most important factor for plant as well as the ecosystem. It channelize nutrients and biomass which are important for the nature. They are associated both the monocots and dicots plants.

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References


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