RESEARCH ARTICLE

Diversity of microfungi on leaf litter of Umarzari forest (MS) India

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ABSTRACT

The partial decomposed leaves were used for understanding the microfungal diversity. Samples were collected from various locations of Umazari forest. The moist chamber, direct isolation and dilution plate methods were used with Potato Dextrose Agar (PDA), Czapek Dox Agar (CDA) and Malt Extract Agar (MEA) nutrient medium supplemented by suitable antibiotics such as penicillin and streptomycin for isolation of fungi. During the investigation, total 26 fungal species were isolated. Most of the isolates belong to the Deuteromycetes and Ascomycetes. Apart from this few species which were isolated belong to Zygomycetes. The Colony Forming Unit and Percent Occurrence of the microfungi were analysed

Key words: leaf litter, decomposition, microfungi, diversity.

INTRODUCTION

Plant residues are a crucial source of nutrients in both natural and agricultural ecosystems, where synchronous plant growth and residue decomposition are essential for soil fertility, and represents a readily available substrate for both soil fauna and soil microorganisms, with the main mineralization activity being performed by soil microbial communities (Dilly *et al.,* 2004), and with the specific quality of organic residues controlling the decomposition rate and related release of nutrients (Neely *et al.,* 1991).

Fungi play important roles in ecosystem. In most forest major source of nutrients for trees is the process of decomposition. Decomposition refers to the process that converts dead organic matter into smaller and simpler compounds. Decomposition is biological process carried out mainly by bacteria and fungi. They act as the recyclers, which break down litter debris to provide nutrients for plants. Accumulation of litter and its decay are essential processes of the overall energy flow and nutrient cycling phenomenon within an ecosystem. Decomposition is the major process involved in the dissipation of energy stored in organic matter in the forest ecosystem. Fungi constitute a major component of soil biota in forest ecosystems. They are heterotrophic and produce extracellular enzymes to utilize the organic substrates present in litter as energy and nutrient sources. Fungi play an important role in leaf litter decomposition as they contribute up to 90% of the total respiration of soil organisms (Kjoller and Struwe, 1982

and decompose the lignocelluloses matrix in the litter that other organisms are only rarely able to decompose (Cooke and Rayner, 1984). Microfungi are important in producing secondary metabolites very useful in agriculture, medicine and pharmaceutical.

The purpose of this study was: 1) to study diversity of leaf litter fungi 2) to isolate and identify leaf litter fungi using morphological features.

MATERIAL AND METHODS

Study area and sampling:

For the sampling purpose the forest area of Umarzari is selected. This place is 56 km away from Bhandara city of Maharashtra state. This forest area found in close vicinity of New Nagzira Wild Life Sanctuary and dominated by Teak trees however; many other types of tree species are also found. The climate remains dry and hot throughout the year with the moderate rainfall from June to middle of October months.

The samples were collected from random locations which were appropriate from ecological point of view. Collections were made between the first weeks of July to last week of October 2010. At the time of collections partial decomposed leaves were collected in a sterilized plastic Ziploc bags (Ziplocs bags were sterilized by absolute alcohol) of size 13cm×10cm and brought to the laboratory for fungal isolation.

Isolation techniques:

For microfungal isolation the Moist chamber, Direct isolation and Dilution plate methods were used. Fungi were cultivated on Potato Dextrose Agar (PDA), Czapek Dox Agar (CDA) and Malt Extract Agar (MEA) nutrient medium supplemented by suitable antibiotics such as penicillin and streptomycin (25mg/lit) to avoid bacterial contamination in culture plates.

RESULTS AND DISCUSSION

Total 28 fungal species belonging to 19 genera were isolated from leaf litter of Umarzari Forest by above mentioned three methods. These are – *Alternaria* sp.1, *Alternaria* sp.2, *Aspergillus caespitosus, A. flavus, A. fumigatus, A. nidulans, A. niger, A. ochraceus, Aureobasidium* sp., *Beltrania rhombica, Chaetomium* sp., *Curvularia* sp., *Fusarium oxysporum, Fusarium* sp.1, *Helminthosporium* sp., *Humicola* sp., *Memnoniella* sp., *Monodictys fluctuata, Penicillium* sp.1, *Penicillium* sp.2, *Pestalotia* sp., *Phoma* sp., *Rhizopus stolonifer, Stachybotris* sp., *Syncephalastrum* sp., *Trichoderma* sp.1, *Trichoderma* sp.2, and Mycelia Sterilia, etc. Similarly many workers isolated number of fungi from different decomposing matter. Elkady *et al.* (1981) isolated 37 sp. of mesophilic fungi belonging to 19 genera from 15 Wheat straw samples by using dilution plate technique. Kiran, Usha and Garecha (1982) isolated *Helmithosporium* sp. and *Fusarium oxysporum* from mushroom compost. Likewise *Fusarium* sp., *Mucor* sp., *Penicillium* sp. and *Trichoderma* sp. were isolated by Harper and Lynch (1984).

20 species belonging to 13 genera of leaf litter fungi were isolated by Direct Plate method using Malt Extract Agar and Czapek Dox Agar medium. Similarly 17 species belonging to 12 genera of leaf litter fungi

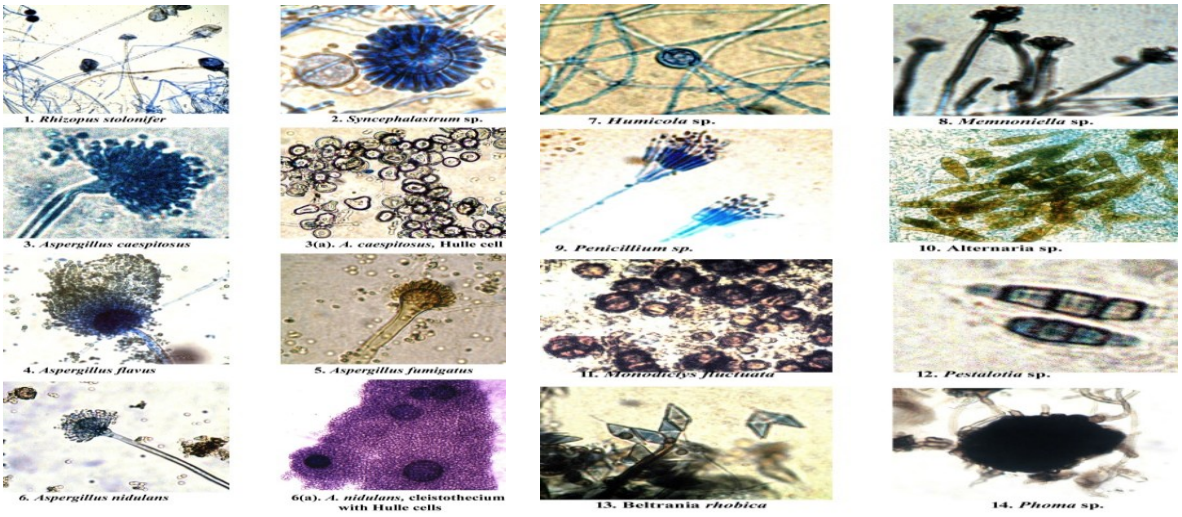

Fig: Pictures of fungal species observed during study.

isolated by Serial Dilution method using Potato Dextrose Agar medium. While only 5 species belonging to 5 genera of leaf litter fungi were isolated by moist chamber method.

The microfungal species *Beltrania rhombica, Humicola* sp., *Curvularia* sp., *Helminthosporium* sp., *Aspergillus caespitosus* and *A. ochraceus* were isolated by segment plate method only. Whereas *Stachybotris* sp. and *Memnoniella* sp. were isolated by moist chamber method and they were neither isolated by segment plate nor by serial dilution method. For the significant isolation of fungi more than one method should be applied (Ramesh and Chalannavar, 1998). These conclusions also correlate with the present study. The isolated fungi have shown variability in their occurrence and number.

The most of the isolated fungi belonging to Deuteromycetes (15 species) and Ascomycetes (8 species) but few members of Zygomycetes (2 species) also isolated during the investigation. These results were very similar to previous work carried out by many workers on isolation of leaf litter fungi and conclude that members of Deuteromycetes and Ascomycetes play active role in the decomposition process. Joshi (1992) observed that most of the fungi isolated from degrading biomass are the members of deuteromycetes whereas very few fungi belong to other groups like ascomycetes and basidiomycetes. Also, Mehrotra and Aneja (1979) reported similar observations when they isolated mycoflora of *Chenopodium* leaf litter.

CONCLUSION

The results indicate the diversity of microfungi belongs to the Umarzari forest. These fungi generally belong to the many different tree species or leaf types. The diversity indicates the decomposition and nutrient recycling which is useful in manure such as compost formation.

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