Think India Journal
ISSN: 0971-1260 Vol-22, Special Issue-31
National Conference ETDAB-2019
Held on 23th & 24th December 2019
Organized by: Deptt. of Botany, Deogiri College, Aurangabad, M.S

HITHERTO ON UNREPORTED MACROFUNGI FROM AURANGABAD (M.S.) INDIA

Vishal Wakode and Sangeeta Ahuja
Department of Botany, Sir Sayyed College, Aurangabad
vishalwakode09@gmail.com

Abstract: Present study deals with the exploration and enumeration of diversity of macrofungal species were recorded from Aurangabad, Maharashtra. This region extends over an area of 139 km^2 lies and still unknown due to unawareness and less attention towards this subject.The floristic composition of this region has been studied earlier by several workers, but the fungus which forms an important part of the ecosystem has been largely neglected in a biodiversity studies. The investigation was first time carried out in this region to explore macrofungi which have socio-economic and medicinal importance. The survey was conducted from June 2016 to December 2018 in six different locations which having dry, deciduous, scrub type of forest vegetation with barren rocky patches scatter all over the region. A total number of 44 macrofungal specimens in 23 genera belonging to 17 families were first time recorded in this region. Dominating species belong to genera *Termitomyces* followed by*Volvariella, Agaricus, Coprinellus, Leucocoprinus* etc.The detailed report of the study has been presented here.

Keywords: Macrofungi, Diversity, Habitats.

1. INTRODUCTION:

Macrofungi can be defined as “macrofungus having a distinct fruiting body which can be either epigeous or hypogeous and enough to be seen by naked eye and to be easily picked by hand”. Macrofungi can be classified into three groups, the saprophytes, the parasites and the symbiotic (mycorrhizal) species due to the absence of chlorophyll; it is unable to synthesize its own food and hence is dependent upon the dead or alive organic matter or substrate for food (Mueller *et al.* 2007, Chang and Miles 1992). Ectomycorrhizal symbiosis in the form of macro fungi include well-known groups that have been explained by accepted terms such as ‘cup fungi’, ‘bracket fungi’, ‘gilled fungi’, ‘puffballs’ and ‘truffles’. Based on the substrate preferences, they have commonly been referred to as humicolous, lignicolous, coprophilous, fungicolous, bryophilous, parasitic may form symbiotic or ectomycorrhizal.

Around 33% forest communities cover the land surface of world (Rumney, 1968) in which ectomycorrhizaeis one of the commonest and dominant forms of mycorrhizal association in most of the forest communities and woodlands of temperate, boreal, tropical and sub tropical latitudes due to the ectomycorrhizal fruit bodies regularly prefer certain particular soil types. Ectomycorrhizal symbiosis plays vital role in physiology, resistance, production, populations of a single trees and ecosystems of ectotrophic species of forest tree (Alexander *et al.* 1990, Egli 1981, Moyersoen *et al.*1998a). There are more than 5,000 fungal species form ectomycorrhizal association with 2000 species of trees, woody shrubs and some herbaceous plants (Kendrick and Berch 1985, Smith and Read 1997).There are evidencesthat one host plant may form mycorrhizal associations with many fungi of same or different species (Wojciechowska 1960, Zak and Marx 1964), even as the opposite is also true that single ectomycorrhizal fungi can associate with several host plants with same or different species (Trappe, 1962) due to the common mycorrhizal networks.

ECM fungi help the growth and development of trees because the roots colonized with ectomycorrhiza are able to absorb and accumulate N, P, K and Ca more rapidly and over a longer period than nonmycorrhizal roots. They dominate in the organic rich soil layer where organic matter accumulates (Harvey *et al.* 1976, Meyer 1973, Stober *et al.* 2001,). Many species of mushrooms have been used in folk medicine for thousands of years because they are natural food having potential value in maintaining health and increase immune system of the human body. Mushrooms have been used as medicine since the Neolithic and Paleolithic eras (Samorini, 2001). The fruiting bodies of mushrooms are having essential vitamins (A, B, C, D, K), major mineral component (K, P, Ca, Mg, Na) and minor elements (Zn, Cu, Mo, Fe, Cd) (Anderson and Fellers 1942,Bano and Rajarathanum 1982).

2. MATERIALS AND METHODS:

2.1) Site Description:

The research study was carried out in the six different areas of Aurangabadcity, (M.S.) occupies approximately 139 km2 area.The co-ordinates for Aurangabad are N 19° 53' 47" - E 75° 23' 54". The city is surrounded by hills on all directions. Selected area having dry,

deciduous, scrub type of forest vegetation having thorny shrubs with barren rocky patches scatter all over the region. The monsoon season present between June-September. Most of the monocots and dicots plants have associates with ectomycorrhizal fungi. Many unusual size and shape macrofungi grown on different substratum. Total study area was divided in six parts with aims to cover the whole area for investigation (Figure no.1). The selected areas 01) Aurangabad caves, 02) Dr. B.A.M. University campus, 03) Himayat bagh, 04) Mukundwadi, 05) Kanchanwadi, 06) Waluj.

2.2) Mushroom Hunting Tools and Instruments:

All the macrofungal samples were collected with using plastic basket, polythene bags, forceps, scissor, scale, brush, long screw driver, shovel, hand lens, black and white papers, containers and notebook. Long screw driver used to pierce in to sufficient depth of soil along with a shovel remove unwanted soil to make possible identification and exposed the connections of the host roots and fungal mycelium. Unnecessary grass or parts of host plant were cut with the help of scissor while forceps used for the collection of small sized mushrooms sporocarps and their mycelium. Basket, polythene bags and containers were used for collection of samples.

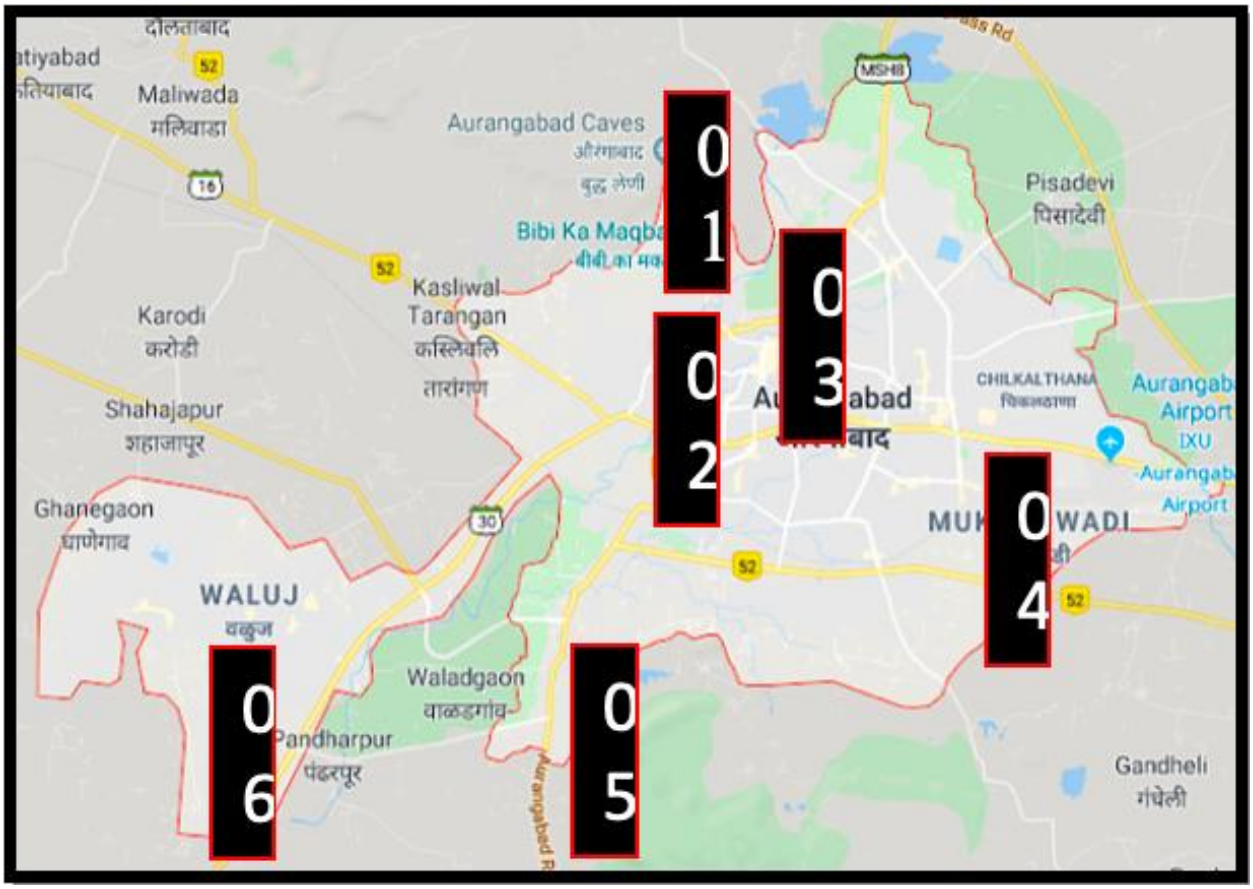

Figure no. 1: Map of study area

01) Aurangabad caves, 02) Dr. B.A.M. University campus,

03) Himayat bagh, 04) Mukundwadi, 05) Kanchanwadi, 06) Waluj.

2.3) Collection Processing:

Samples were collected in throughout the year with monthly interval but most of the samples were recorded in monsoon period in month of June to November from 2016 to 2018. Total 44 fungal specimens were collected from different location of Aurangabad city by hand picking method with the help of above mention mushroom hunting tools (Table no. 1). Dig out the all samples from ground safely in a way that the attachment of ECM fungal hyphae and their root of host should not be damage as well as avoid the disturbance species habitats. All ECM species were collected from the non reserved region like roadsides, landscapes, grasslands, pastures.

Visits on locations of study area for collection of ECM species were made in the early morning (6 am to 10 am) allowing time to go back to the laboratory for detailed macro-micro examination and to begin proper drying of specimens on the day of collection.] The habitat and morphological characteristics of the macrofungi were observed and noted as well as digital field photography of samples has taken in current collecting time and locations by Digital Nikon Camera for detection during the collection.

3. RESULT AND DESCUUSION:

3.1) Distribution of Mushrooms in Different Fungal Families:

A total number of 44 species in 23 genera belonging to 17 families of Basidiomycotina were considered for the ecological studies. Out of these 38 samples identified up to species level and 06 samples up to species level. Agariaceae family dominated by 9 species, where as 5 species comes under each to Psathyrellaceae and Lyophyllaceae, 4 species to Pluteaceae, 3 species each to Polyporaceae, single species each to Inocybaceae, Lepiotaceae, Meruliaceae, Hymenochaetaceae, Hymenogastraceae, Pleurotaceae and Schizophyllacae. Macrofungal samples were collected in six locations in Aurangabad such as, Aurangabad caves, Dr. B.A.M. University campus, Himayat bagh, Kanchanwadi, Mukundwadi and Waluj. The most diversity of macrofungal species found in Himayat bagh followed by Dr. B.A.M. University campus, Aurangabad caves, Mukundwadi, Kanchanwadi and Waluj.

4. CONCLUSION:

A total 44 mushroom species were recorded in Aurangabad city. The climate and humidity of Marathwada region of Maharashtra state are favorable for growth of macrofungi. The current study suggests that the studied area of Aurangabad is a treasure house for macrofungi. These macro fungi play an important role in the maintenance of ecosystem and also serve as a substitute of food for the local inhabitants. Most of farmers and tribal community gathers wild fungi from around the study sites for consumption as well as for selling in the local market. Considering the importance of macro fungi with regards to environment, health and economy, their documentation is very essential.

Table no. 1: Diversity of Macrofungi Species with their Substrate

Sr. No	Species	Family	Habitat
01)	*Agaricus arvensis* Schaeff.	Agariaceae	On ground amongst grasses
02)	*Agaricus grandiomyces*Zhou and Zhao	Agariaceae	On ground
03)	*Agaricus martinicensis* Pegler	Agariaceae	On ground
04)	*Agaricus placomyces* Peck.	Agariaceae	On ground
05)	*Auricularia auricula-judae* (Bull.) Schrot.	Auriculariaceae	On dead stumps of Mango
06)	*Auricularia polytricha*(Mont.) Sacc.	Auriculariaceae	On dead logs of Mango
07)	*Bovista sp.*	Agariaceae	On ground
08)	*Conocybe apala* (Fr.: Fr.) Arnolds	Bolbitiaceae	On ground
09)	*Conocybe tenera* (Schaeff: Fries) Fayod.	Bolbitiaceae	On ground
10)	*Coprinellus domesticus* (Bolton) Vilgalys, Hopple & Johnson	Psathyrellaceae	On the dead trunks of tree
11)	*Coprinellus flocculosus* (DC)Vilgalys, Hopple & Johnson	Psathyrellaceae	On dead burn stumps
12)	*Coprinellus micaceus* (Bull.) Vilgalys, Hopple and Johnson	Psathyrellaceae	On dead logs of Ashoka tree
13)	*Coprinopsis cinerea* (Schaeff.) Redhead, Vilgalys & Moncalvo	Psathyrellaceae	On dead burn charcoal
14)	*Coprinopsis picacea* (Bull.Fr.) Redhead, Vilgalys &Moncalvo	Psathyrellaceae	On dead stumps of Mango stone / seed husk
15)	*Coprinus comatus* (O.F. Mull.) Pers.	Coprinaceae	On ground amongst grasses
16)	*Ganoderma applanatum* (Pers.) Pat.	Ganodermataceae	On the trunks of Babul tree
17)	*Ganoderma lucidum* (Curtis) P. Karst.	Ganodermataceae	On the trunks of Babul tree
18)	*Gymnopus confluens* (Pers.)	Marasmiaceae	On ground
19)	*Inocybe sp.*	Inocybaceae	On ground
20)	*Lentinus sp.*	Polyporaceae	On ground
21)	*Leucoagaricussp.*	Agariaceae	On ground
22)	*Leucocoprinus brebissonii* (Godey) Locq.	Agariaceae	On ground amongst grasses
23)	*Leucocoprinus cretaceus* (Bull.) Locq.	Agariaceae	On ground amongst grasses
24)	*Leucocoprinus fragilissimus* (Berk. and Curtis) Pat.	Agariaceae	On ground amongst grasses
25)	*Macrolepiota procera* (Scop.Fr.) Singer	Lepiotaceae	On ground amongst grasses
26)	*Marasmius* sp.	Marasmiaceae	On ground amongst grasses
27)	*Neonothopanus hygrophanus* (Mont.) De Kesel & Degreef	Marasmiaceae	On dead trunk of tree
28)	*Panaeolussp.*	Bolbitiaceae	On ground amongst grasses
29)	*Parasola plicatilis* (Curtis) Fr. Redhead, Vilgalys & Hopple	Coprinaceae	On ground amongst grasses
30)	*Phellinus robustus* (P. Karst.) Bourdot & Galzin,	Hymenochaetaceae	On dead trunk of Babul tree
31)	*Pleurotus ostreatus* (Jacq.) P. Kumm.	Pleurotaceae	On dead trunk tree
32)	*Podoscypha nitidula* (Berk.) Pat	Meruliaceae	On ground
33)	*Psilocybesp.*	Hymenogastraceae	On ground
34)	*Pycnoporus cinnabarinus* (Jacq.: Fr.) P. Karst.	Polyporaceae	On, dead and decaying stumps
35)	*Schizophyllum commune* Fr.	Schizophyllacae	On dead trunk of Babul tree
36)	*Termitomyces clypeatus* Heim.	Lyophyllaceae	On ground amongst grasses
37)	*Termitomyces globulus* R. Heim & Gooss.	Lyophyllaceae	On ground
38)	*Termitomyces heimii* Natarajan	Lyophyllaceae	On ground/ roots of Neem tree
39)	*Termitomyces reticulatus* Van der Westh. & Eicker,	Lyophyllaceae	On ground
40)	*Termitomyces umkowaan* (Cooke & Massee) Reid	Lyophyllaceae	On ground
41)	*Volvariella bombycina* (Schaeff. Fr.) Singer	Pluteaceae	On the trunks of Jatropha plant
42)	*Volvariella bombycina* var. *flaviceps* (Murrill) Shaffer.	Pluteaceae	On the trunks of Jatropha plant
43)	*Volvariella taylorii* (B. & Br.) Singer.	Pluteaceae	On the trunks of Gulmohar tree
44)	*Volvariella volvacea* Bull. Singer	Pluteaceae	On the trunks

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Photo Plate: Fruiting bodies of Collected Macro fungi

a) Agaricus arvensis.*b) *Agaricus martinicensis,

c) *Agaricus grandiomyces*d) *Agaricus placomyces,*

e) ***Auricularia auricula-judae,*** **f)** ***Auricularia polytricha***

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