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Documentation of wild Mushrooms (macro fungi) from Palamuru University campus, Telangana state, India

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This is an attempt to provide a broad depiction diversity of macro-fungi belonging to the class Basidiomycetes in greenery vegetated areas of Palamuru university campus. A total number of 22 fruiting bodies were collected and cultured. Palamuru university campus is located near the Mahabubnagar town, with latitude 16.720, longitude 77.981. The average temperature in campus is 27.0 °C. The average annual rainfall is 882 mm. The climatic conditions and soil are suitable for growth and improvement of diverse species of mushrooms. A variety of wild mushroom species were documented during rainy season of each July to Sept of 2015-19 years. In the present report, fifteen diversified mushroom genera were recorded. Among the fifteen genera, 22 species were covered. In these 22 species four were edible, eight were medicinal and ten were nonpoisonous. This report documented the profusion of the mushrooms in the campus.

Keywords : Macro fungi,Mushroom Diversity, Wild mushrooms

INTRODUCTION

Mushrooms grow commonly wild in nature, but they are also cultivated since ancient and these are considering as “Food of the Gods” due to lofty nutritional components. These are very much well-known known for their taste, fragility, flavor and dietary excellence. Usually mushrooms grow in all kinds of soil, on putrefying organic matter, wood stumps, termite nests etc. Preponderance of mushrooms are saprophytes and few allied with plant roots i.e., referred to as mycorrhizal mushrooms (Madrigal *et al*. 2002). Mushrooms thrive well at virtual humidity levels about 95-100%, and substrate moisture levels at 50 - 75% (Madrigal *et al*. 2002).

There are about 69 thousand identified mushroom species of which 2000 species are regarded as major edible mushrooms. But, only a small number of species are being cultivated commercially all over the world. Because mushrooms are ephemeral in nature, they require constant survey and collection during appropriate seasons. The life cycle of a mushroom begins with spore germination, which generates a main mycelium. This mycelium grows in branches and creates a mycelia network. When two sexually compatible hyphae networks collide and form a mycelium, the resulting mycelium is dikaryotic (Vane, 2003). This mycelium is fertile and has the ability to produce fruit bodies.

Characterization of mushroom species necessitates a basic understanding of fungus structure. Shape, size, texture, colour, and aroma of the fruiting body are phenotypic features used to identify mushroom species. However, in recent years, molecular tools have provided strong support for mushroom taxonomy. To identify wild

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mushrooms, molecular markers, particularly DNA-based approaches, are quick and reliable. The Internal Transcribed Spacer (ITS) region and the 18S rRNA gene sequence are the most commonly utilized approaches in molecular phylogenetics of mushrooms because these sequences are preserved throughout life history and evolution (Kumari 2012).

The current report aimed to document the diversity of the mushroom species from Palamuru university campus. Further molecular identifications have been planned to be carried out in future studies.

MATERIALS AND METHODS

Sample collection

Basidiomycetes fungi were collected from different regions of Palamuru University campus. After collection, taxonomic identification of the macro fungi was made according to literature (Atri *et al*. 2005) and representative specimens were preliminarily morphologically identified (Jordan and Kilkenny, 2024) and deposited in the Department of Botany, Palamuru University. Edible, inedible and poisonous nature of collected specimens was also recorded based on literature (Atri *et al.* 2003).

Preparation of specimens for Meixner test

Mushroom samples after identification were placed in a plastic container and allowed to dry using airflow. Turnover was done for every 8 hrs for even drying. After complete drying it was stored in a labeled screw cap bottles and zip lock covers for further use.

Meixner test

A preliminary study was conducted to detect toxins associated with naturally occurring macrofungi. Standard procedure used for the detection of specific toxins was "the Meixner Test" (Borthakur *et al.* 2020).

Requirements : Mushroom sample, lignin containing paper, pencil, micro-centrifuge tube, glass-rod, methanol and concentrated HCl.

Procedure : Mushroom specimen (1 g) was weighed in a labeled micro centrifuge tube and 1ml of methanol was added. The tubes were shaken well and kept overnight at room temperature. Then the mushroom sample was homogenized using sterile glass rod. The tubes containing sample extract was subjected to centrifugation at 1000 rpm for 3 min. from the supernatant, 2-3 drops of the sample extract was added to lignin containing paper with micropipette. The spot was marked with pencil and allowed to dry. 1-2 drops of concentrated hydrochloric acid was added to the area of the spot and left for about 10-20 min. · A drop of acid was also added on the other side of the paper and marked as control. · Observation was made for the change in color of the spot on the paper which indicates the presence of toxins in the tested sample. · The test was conducted in triplicates (Borthakur *et al.* 2020).

Isolation, culture conditions and microscopic identification

The mushroom fruiting bodies were collected in the rainy season from campus of Palamuru University. This is rich in biodiversity zone. The campus includes around 156 acres of area i.e., Biodiversity zone, Botanical garden, natural zone. In the campus 20% of the location is using for building construction, whereas the rest of the 80% of the land area is naturally diversity is maintaining and conserving.

The collected fruiting bodies were washed twice with sterile water, soaked in 2% sodium hypochlorite for 5 minutes. Then once washed with sterile water and cut into small pieces were inoculated using PDA media in the aseptic conditions in the laminar air flow. The first colonies were repeatedly inoculated till then getting pure culture. Then it has observed under microscope and identified (Hua *et al*. 2022).

RESULTS AND DISCUSSION

The fruiting bodies of mushrooms were collected from study area (Fig.1) Palamuru University campus, Telangana State, India. A total number of 22 fruiting bodies (Table 1) were collected and deposited at the Department of Botany. The

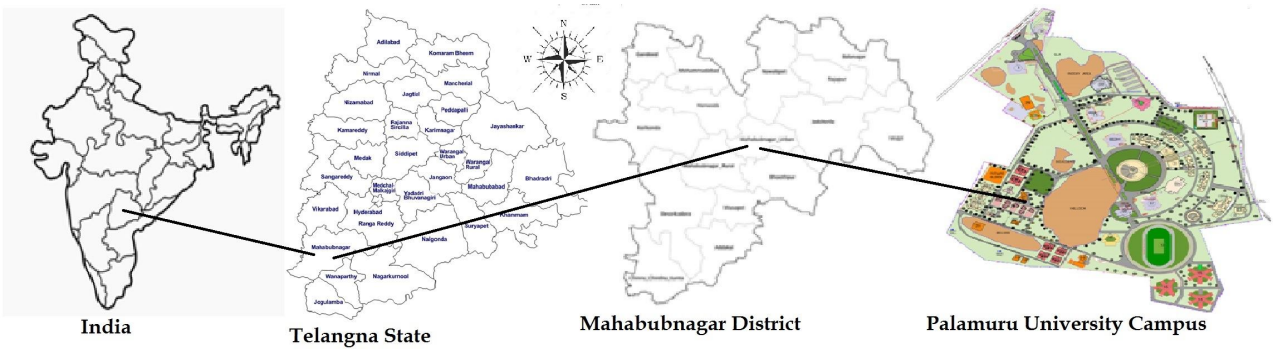
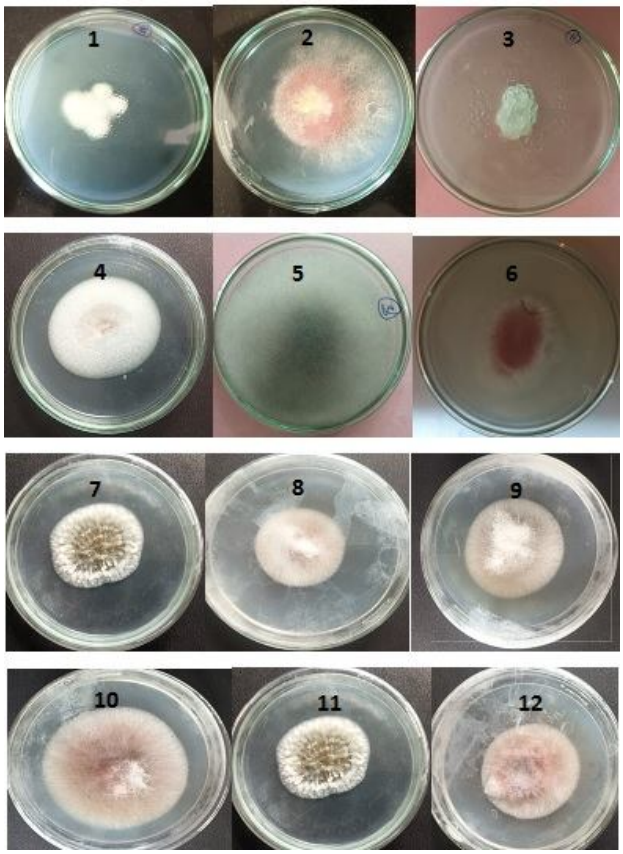


Fig. 1: Study area, Palamuru University campus, Mahabubnagar, Telangana State, India

Fig. 2: Different macrofungi collected from study area. **A**-*Agaricus bisporus;* **B**- *Agaricus* sp. **C**-*Agrocybe pediades;* **D**-*Agrocybe semiorbicularis;* **E**-*Agrocybe pedides;* **F**- *Coprinellus disseminates;* **G**- *Ganoderma austral;* **H**- *Ganoderma lucidum;* **I**- *Lepiota fuscovinacea;* **J**- *Lepista* sp. **K**- *Leucoagaricus crystallifer*; **L**- *Macrolepiota dolochula;* **M**- *Macrolepiota globose;***N**- *Marasmius leveilleanus;* **O**- *Marasmius* sp. **P**-*Ompholotus olivascens;* **Q**-*Panus conchatus;* **R**- *Phlebopus portentosus;* **S**-*Podoscypha petalodes;* **T**- *Polyporus arcularius;* **U**- *Termitomyces* sp. **V**- *Tricholoma giganteum*

Mushroom Herbarium Voucher numbers have been allotted and cultured. Palamuru University campus comprises 156 acres land area located with latitude 16.720, longitude 77.981. The average temperature in campus is 27.0 °C. The average annual rainfall is 882 mm. The climatic circumstance and soil are agreeable for growth and improvement of diverse species of mushrooms. A multiplicity of wild mushrooms species were documented during rainy season of each July to Sept of 2015-19 years. In the present report, fifteen diversified mushroom species were recorded. Amongst 22 species, four species were edible, eight species were medicinal and ten species were nonpoisonous. This report ragged the profusion of the mushrooms in the campus. The macro fungi isolated and their details have been depicted in Fig. 2. Growth of some of the isolated fungi in petri plates have also been shown in Fig. 3.



Figs 2 – 1*: Agaricus bisporus* 2: *: Podoscypha petalodes,* 3: *Agrocybe pediades, 4: Tricholoma giganteum, 5: Podoscypha petalodes 6: Coprinellus disseminates, 7: Ompholotus olivascens, 8: Polyporus arcularius, 9: Lepiota fuscovinacea, 10: Phlebopus portentosus,*11: *Leucoagaricus crystallifer,12: Macrolepiota dolochula.*

Besides, the morphological characters of the fruiting body, and their characters have also been given in Table 1. In similar studies, Varghese *et al.* (2010) documented wild mushrooms from Kerala and discussed their importance while Krishna *et al.* (2015) reported the presence of more than 50 macrofungi from the forests of Telengana. Senthilarasu and Kumaresan (2016)

Table 1: Field information and phenotypic character of macro fungi recorded during collection

Name of identified mushrooms	Herbarium Voucher Number	Family	Habitat	Character of Pileus		Character of Gills	Annuals	Character of Stipe
				Color	shape			
Agaricus sp. (J.E.Lange)	MHPU501	Agaricaceae	Soil	Cream	Petal like	Free	Present	Equal
Agaricus sp. (J.E.Lange)	MHPU502	Agaricaceae	Soil	Golden yellow	Funnel	Free	Present	Equal
Agrocybe pediades (Fr.) Fayod	MHPU503	Strophariaceae	Soil	Creamy white	Convex	Sinuate	Absent	Equal
Agrocybe semiorbicularis (Pers.) Fayod	MHPU504	Strophariaceae	Dry leaf debris	Light brown	Plane	Sinuate	Present	Equal
Agrocybe pedides (Fr.) Fayod	MHPU505	Strophariaceae	Dry leaf debris	Light whitish	Plane	Sinuate	Present	Equal
Coprinellus disseminates Jakob Emanuel Lange.	MHPU506	Psathyrellaceae	Dead wood	White	Convex	Adnate	Absent	Equal
Ganoderma austral (Fr.) Pat.	MHPU507	Ganodermataceae	Wood	Dark brown with	Irregular	Absent	Absent	Sessile
Ganoderma lucidum (Fr.) Pat.	MHPU508	Ganodermataceae	Soil	Brown	Convex, Kidney shape	Sinuate	Absent	Equal
Lepiota fuscovinacea F.H. Møller & J.E. Lange	MHPU509	Agaricaceae	Soil	Orange	Flat	Free	Absent	Equal
Lepista sp.	MHPU510	Tricholomataceae	Dry leaf debris	white margin	Convex	Attached	Absent	Equal
Leucoagaricus crystallifer Vellinga	MHPU511	Agaricaceae	Dry leaf debris	Yellowish brown	flat	Free	Present	Trapping upward
Macrolepiota dolochula (Berk.) Sing.,	MHPU512	Agaricaceae	Soil	Creamy white	Convex	Free	Present	Equal
Macrolepiota globosa (Berk.) Sing.,	MHPU513	Agaricaceae	Soil	White	Umbonate	Free	Present	Traping upward
Marasmius leveilleanus (Berk.) Sing.,	MHPU514	Marasmiaceae	Soil	brown	Depressed	Free	Absent	Equal
Marasmius sp. (Berk.) Sing.,	MHPU515	Marasmiaceae	Humas	Cream purple	Plane	Sinuate	Absent	Trapping upward
Ompholotus olivascens Victor Fayod	MHPU516	Omphalotaceae	Wood	Grey	Convex	Decurrent	Absent	Equal
Panus conchatus (Bull.)Fr.,	MHPU517	Polyporaceae	Wood (*Causuraina*)	White	Umbonate	Decurrent	Absent	Equal
Phlebopus portentosus (R.Heim) Singer	MHPU518	Boletinellaceae	Soil	Creamish white	Convex	Absent	Absent	Trapping upward
Podoscypha petalodes (DC.) Singer	MHPU519	Meruliaceae	Dry leaf debris	Orange	Convex	Absent	Absent	Absent
Polyporus arcularius (Batsch) Zmitr.	MHPU520	Polyporaceae	Soil	Brown	Convex	Present	Absent	Equal
Termitomyces sp. (Beeli) R.Heim	MHPU521	Lyophyllaceae	Soil	Greenish brown	Uplifted	Present	Absent	Trapping upward
Tricholoma giganteum (Beeli) R.Heim	MHPU522	Tricholomataceae	Soil	Creamy light brown	Plane	Present	Absent	Trapping upward

documented from Western ghats of Karnataka state. Manoharachary and Nagarjan (2016) conducted a survey of fungi (2012-2014) associated with litter samples collected from selected forest localities of Telangana and it was revealed that *Craspedodidymum abigianense, Cryptocoryneum condensatum, Septosporium bulbotrichum, Bactrode smiumlinderi* form new additions to the fungi of India.

The current reported study area however, has not been covered. So it is the first and advantageous outcome for the future researchers.

The current report aimed to document the available species from study area. In the past, report of few authors (Li and Tian, 2021) have mentioned mild toxicity of these species, but poisoning is limited to gastrointestinal upset in a

few cases. Aside from small-scale cattle rearing and poultry production, agriculture is the primary source of livelihood and income for the residents. Females help their male counterparts with a variety of agricultural tasks such as seeding, harvesting, and weeding. Threshing of crops and grain storage. They also look after the cattle and, every morning, transport the livestock to surrounding forests or grazing pastures for grazing, as well as collect firewood and non-wood products. They will bring forest products and WEM with them when they return home. The practice of following youngsters while collecting non-wood forest products and WEM also passes on vital information about these abundant resources to the future generation (Kumar and Sharma, 2011).

CONCLUSION

The current documentation, isolation and identification of the macro fungi from the biodiversity zone of Palamuru university campus have identified fifteen genera and twenty two species. Among these 22 species four species were edible, eight species were medicinal and ten species were nonpoisonous. The current information will provide fundamental awareness to the upcoming researchers. Further molecular identifications have been planned to be carried out in the forthcoming reports.

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DECLARATION

Conflict of Interest. Authors declare no conflict of interest.

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