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Studies on Some Basidiomycetes Fungi in the Forest Of Dediapada, Gujarat, India

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Abstract- Basidiomycota is one of the most interesting and advanced group of macroscopic fungi. The Dediapada forests, constitute prime forest cover where the Gujarat State is concerned, keeping in mind that forests hardly constitute 10% of Gujarat's land area. A continue field survey was carried out in the Dediapada for the study of certain Basidiomycota fungi during the month of July-2017 to September-2017 and July-2018 to October-2018. Many fungi were observed, photographed, collected, studies and preserved. The present study gave a total of 94 species and 45 genera belong to 30 families of Basidiomycetes in the forest region of Dediapada, Gujarat, India.

Keywords: Fungi, Basidiomycetes, Dediapada forest, South Gujarat, India.

1. INTRODUCTION

The group fungi are found to be distributed everywhere i.e., cosmopolitan. Based on their different characters they are divided in to different categories. Some are lower fungi and some are higher fungi. Among all fungi, a group called Basidiomycota is one of the most interesting and advanced group of macroscopic fungi. The visual fungi of Basidiomycota include different groups, like mushrooms, puffballs, stinkhorns, bracket fungi, Polypores, jelly fungi, boletes, chanterelles, earth stars, smuts, and rusts etc.

About 80000 to 120000 species of fungi have been described to date, although the total number of species is estimated at around 1.5 million (Hawksworth, 2001; Kirk et al., 2001). The Basidiomycota contains about 30,000 species (Kirk et al. 2001). The most conspicuous and familiar Basidiomycota are those that produce mushrooms fruiting bodies, which are sexual reproductive structures. The Basidiomycota also includes yeasts (single-celled forms) and asexual species (Fell et al. 2001). Basidiomycota are found in virtually all terrestrial ecosystems, as well as freshwater and marine habitats (Kohlmeyer and Kohlmeyer, 1979; Hibbett and Binder, 2001).

A simplified, artificial classification of the Basidiomycetes

– rusts
– smuts
– others
– heterobasidiomycetes (divided basidium; e.g. wood ears, jelly fungi)
– homobasidiomycetes (simple, undivided basidium)
– 'gasteromycetes' (e.g. puff balls, earth stars, stink horns, birds-nest fungi)
– 'hymenomycetes'
– Dacrymycetales
– 'Agaricales' (broad sense, e.g. mushrooms, toadstools, boletes)
– 'Aphyllophorales' (e.g. bracket and shelf fungi, corticioid fungi, toothed and spined fungi, coral fungi)
– Others

Humans have found diverse uses for Basidiomycota. Mushrooms, both cultivated and wild are eaten in many countries. For the untrained, mushroom-hunting is a risky endeavour, because some Basidiomycota produce deadly toxins (Benjamin 1995). A few mushrooms are known to be the sources of different bioactive substances like antibacterial, antifungal, antiviral, antiparasitic, antioxidant, anti-inflammatory, antiproliferative, anticancer, anti-HIV, antidiabetic and hepatoprotective substances, among others. These mushrooms have been utilized as ethnomedicines by tribal for treatment of different sicknesses (Gudikandula et al, 2015).

The State Gujarat is filled with immense diversity of flora, which have been studied and explored a lot form different part of it. Along with this there is also a great diversity of a group called Fungi in Gujarat. The South Gujarat is diversely filled with the dense distribution of fungi. The Dediapada forests, in the south of Gujarat, constitute prime forest cover. More over these forests are a part of the Shoolpaneshwar Wildlife Sanctuary. The area has assumed greater significance in recent times as it forms the major portion of the Sardar Sarovar

submergence area. In the given scenario, the moist mixed deciduous and dry mixed deciduous forests (Champion and Seth, 1968) of this region gain importance for future preservation and conservation.

2. MATERIALS AND METHOD

Field survey

Most of the fleshy and gilled macro fungi were prevalent in the rainy times of the year as this time is favourable for their output, since there is ample moisture, favourable warmth, relative humidity, and sunshine, which furthermore aids the macro fungi in the decomposition of dead organic tissue. The early dry time of the year collection was predominated by the polypore's since there is decline in rainfall and relative humidity, boost in warmth, and sunshine and most of the fleshy macro fungi will not withstand these conditions. During rainy season, there is abundant growth of several kinds of Basidiomycetes. Many fungal species groups do not produce visible fruit bodies or other species-specific characteristics, or these characteristics are extremely rare and cannot be detected in traditional surveys. A continuous field survey was carried out in the region of Dediapada forest of South Gujarat. The survey was done from July-September 2017 and July-October 2018. Along with the forest area, cultivated fields and many educational campuses were also studied.

Field study and Collection of Samples

For the collection and study of samples, the manual published by the Mycology SAFRINET in (1999), The manual by Megan Prance and Nigel Fechner, Queensland Herbarium (2017) and the method given by Hailing (1996) was followed. In order to avoid the damages and scars the samples were collected with proper care and transferred in to sterile ziplocked polythene bag. Forceps, knife as well as steel spatula was used for the collection of samples. Most of the characters were noted down in field itself. A good photograph with DSLR were taken before and after collection of samples.

Identification of Macro-fungi

Seven mycological characters useful in tentative identification of mushrooms are hymenium type, cap shape, gills, stipe character, colour of the spore print, ecological type, and edibility. The species of Basidiomycota were identified by comparing the morphological characters found in the literature available (Arya, 2004) (Rajput, et al 2015), (Nagadesi & Arya, 2014). Identification was also done by the key available in book by Thomas Lassoes (2013). Some fungi were also referred to the checklist given by Legon & Henrici (2005).

Preservation

Samples were preserved using both dry as well as fresh method. Specimens were dried using oven and preserved fresh in 2% as well as 4% formaldehyde. The specimens preserved are submitted in the Department of Botany, Bioinformatics and Climate Change Impacts Management, Gujarat University.

3. RESULT AND DISCUSSION

In Basidiomycetes more than 2000 species of edible mushrooms are reported from different components of the world. People all over Asian countries in the twentieth century know that mushrooms are important bio-source of novel secondary metabolites. In India, the alternative systems of medicine utilize the curative properties of mushrooms. Secondary metabolites of these mushrooms are chemically diverse and possess a broad spectrum of biological activities, which are explored in traditional medicines. The resent study shows 71 species belonging to 33 genera of 19 families from Basidiomycetes in Dediyapada Forest division listed in Table No. 1. Agaricaceae is most dominant family with 7 genus and 23 species followed by Psathyrellaceae with 7 genus and 11 species, Marasmiceae 6 species, Lyophyllaceae 5 species and others are less than 2 species. *Agaricus* is the most dominant genera with 8 species followed by Marasmus 6 species, Termetomyces, Coprinellus and Leucoagaricus 5 species each and others are less than 5 species. Majority of basidiomycetes are naturally occurred on Dead decomposed parts and Soil.

4. CONCLUSION

Amongst the vast number of living forms very little amount of attention has been paid to conservation of fungal diversity. Due to loss of natural habitats, soil and air pollution and loss of genetic diversity many fungal species are on threat. Numerous mushrooms still stay unreported and their healthful and in addition medical advantages are unclear to us. Henceforth, an opportune examination in regard to isolation, identification, and characterization of the current mushroom vegetation is vital. The outcome of the present study elaborates the information on diversity of fungi of the study area.

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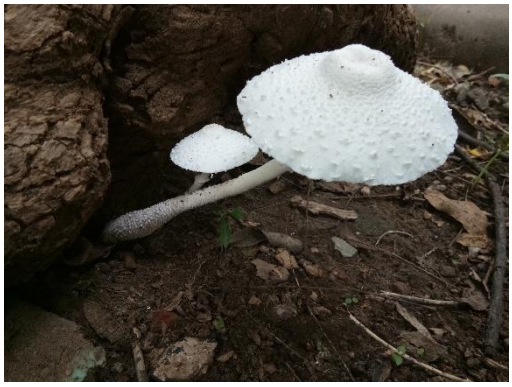
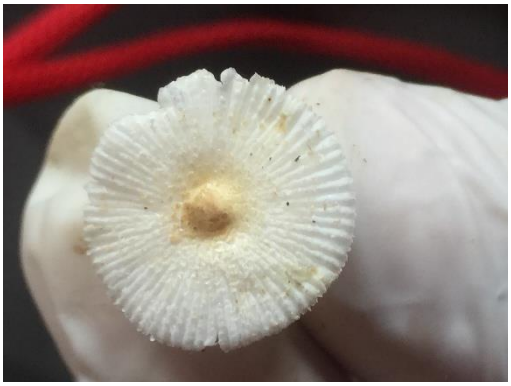
PHOTO PLATES OF BASIDIOMYCOTA FUNGI

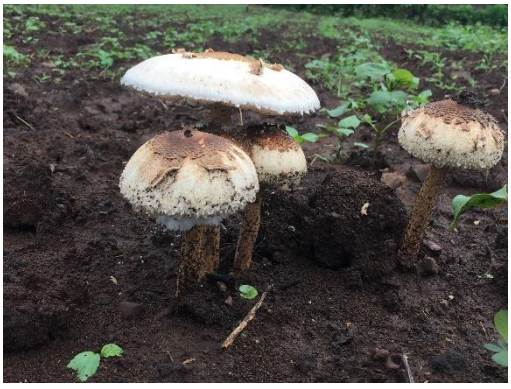


Leucocoprinus cretaceous

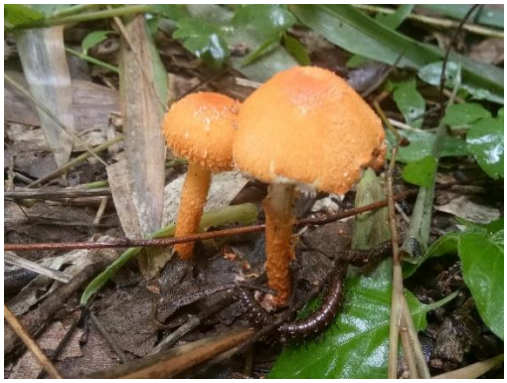


Leucocoprinus fragilissimus

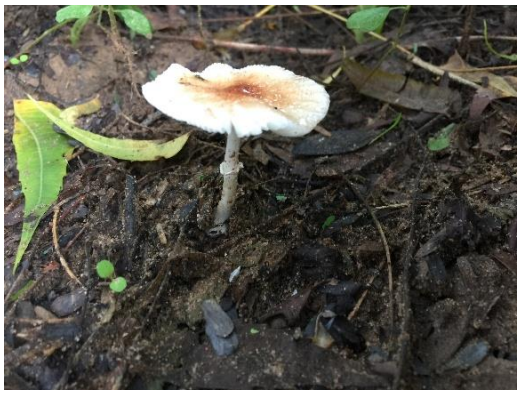
Lepista nuda



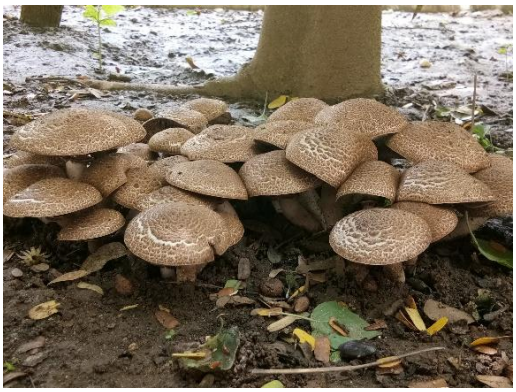
Macrolepiota procera



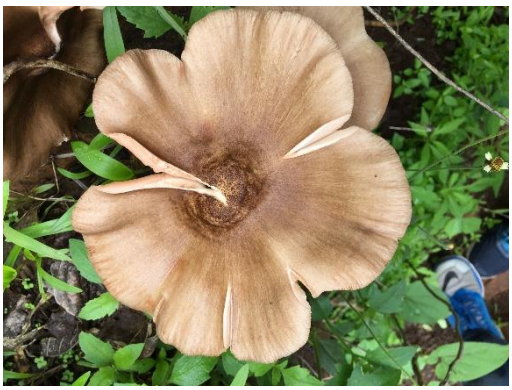
Cystoagaricus trisulpharatus



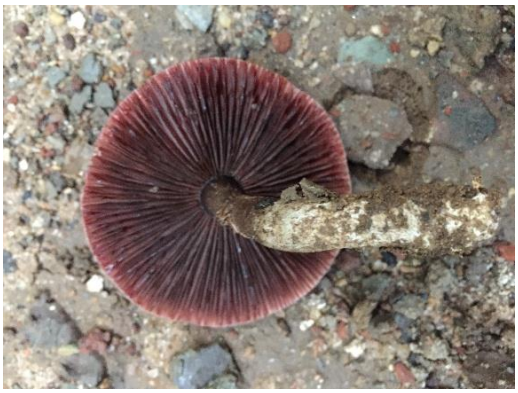
Leucoagaricus robrotinctus



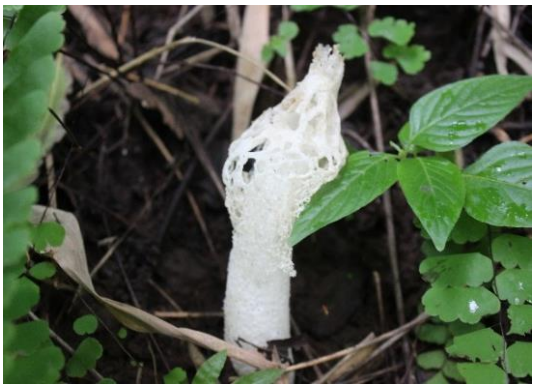
Agaricus bohusii



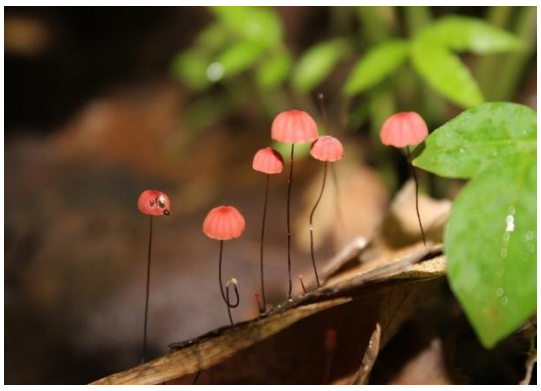
Pluteus cervinus

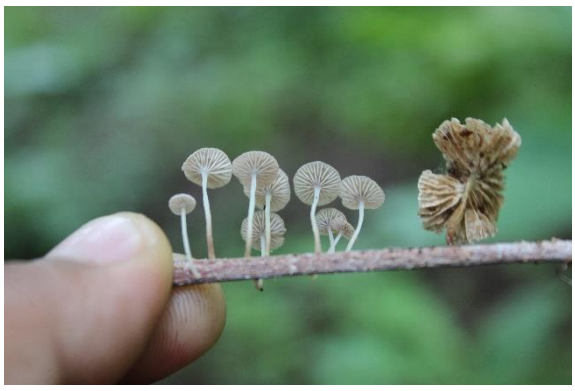


Agaricus silvaticus



Phallus impudicus





Marasmius haematocephalus

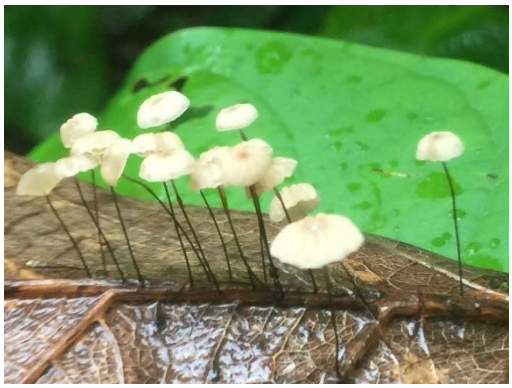
Marasmius epiphyllus

Termitomyces haemii

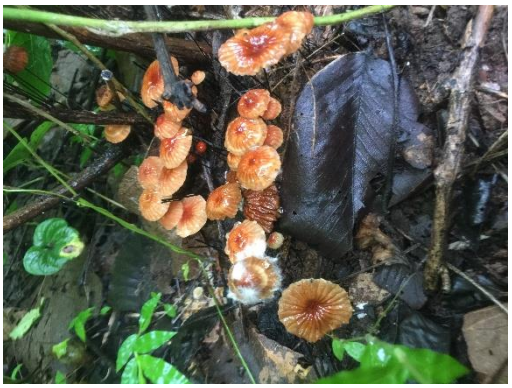
Geastrum saccatum

Psathyrella candolleana

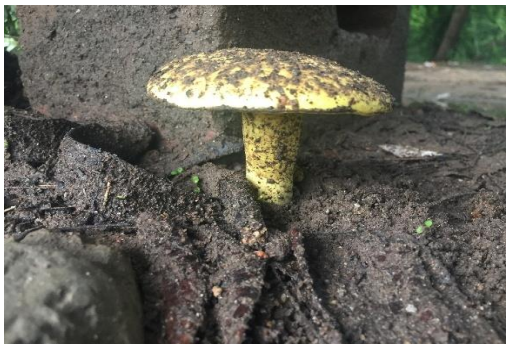
Panaeolus papilionaceous



Marasmius capillaris



Marasmius sicus



Phylloporus rhodoxanthus

Agaricus agustus

Table No. 1: List of Basidiomycetes fungi found in the Dediapada region forest of South Gujarat.

List of Basidiomycetes fungi found in the Dediapada region forest of South Gujarat					
Sr. No.	**Family**	**Genus**	**Species**	**Substratum**	**Location**
1	Agaricaceae	*Agaricus*	*silvaticus*	Soil	Dediapada, kundiamba
			bitorquis	Dead decomposed part of soil	Dediapada, korvi
			Agustus	Dead decomposed part of soil	Navagam, malsamot
			campestris	Soil	Timbapada
			bisporus	Dead decomposed part of soil	Timbapada, malsamot
			impudicus	Dead decomposed part of soil	Netrang
			trisulpharatus	Dead decomposed part of soil	Navagam, sagai
			Blazei	Soil	Sagai
		Lepiota	*Cristata*	Dead decomposed part of soil	Zhadoli
			atrodisca	Dead decomposed part of soil	Zhadoli
		Leucoagaricus	*rubrotinctus*	Dead decomposed part of plant material	Malsamot
			americanus	Dead decomposed part of plant material	Malsamot
			melanotrichus	Dead decomposed part of plant material	Sagai, kokam, fulsar
			nympharum	Dead decomposed part of plant material	Kokam, fulsar, saribar
			tangerinus	Dead decomposed part of plant material	Devmogra,
		Leucocoprinus	*cretaceus*	Base of neem stem.	Kokam
			birnbaumii	Dead wood of teak	Sagai, kokam, fulsar,malsamot, ninaidhodh
			cepaestipes	Dead decomposed part of plant material	Sagai, kokam
			fragilissimus	Dead decomposed part of plant material	Sagai, kokam, dumkhal
		Podaxis	*Pistillaris*	Soil	Zhadoli
		Macrolepiota	*Procera*	In agricultural field (Soil)	Navagam, sagai
			clelandii	Soil	Fulsar, Vandri,dediapada
		Lycoperdon	*perlatum*	Soil	Sagai,Shoolpaneshwar Wildlife Sanctuary
2	Auriculariaceae	*Auricularia*	*polytricha*	Bark of tree (Mango, Butea etc.)	Kokam,Shoolpaneshwar Wildlife Sanctuary
3	Bolbitiaceae	*Canocybe*	*pubescens*	Cow dung and and house	Fulsar, vandri, kokam
		Panaeolus	*papilionaceus*	Cow dung	andu
			sphinctrinus	Cow dung	Fulsar, vandri, kokam
4	Boletaceae	*Phylloporus*	*rhodoxanthus*	Soil	Fulsar, vandri, kokam

5	Geastraceae	*Geastrum*	*saccatum*	Dead and decomposed part of Bamboo	
6	Gomphaceae	*Ramaria*	*Stricta*	wood	Devmogra, mosit
7	Hymenogastraceae	*Galerina*	*marginata*	Cow dung wall	Sagai,Shoolpaneshwar Wildlife Sanctuary
8	Lyophyllaceae	*Termetomyces*	*Heimii*	Soil	Saribar, Kokam, Dumkhal, Sagai, Devmogra,Fulsar
			globulus	Soil	Saribar, Chuli, Kokam, Dumkhal, Sagai, Devmogra
			Eurhizus	Soil	Saribar, Kunbar, Kokam, Dumkhal, Devmogra,Fulsar
			albuminosus	Soil	Saribar, kunbar, Kokam, Dumkhal, Sagai, Devmogra,Fulsar
			microcarpus	Soil	Saribar, kunbar, Kokam, Sagai, Devmogra,Fulsar
9	Marasmiaceae	*Marasmius*	*capillaris*	Dead leaves	Sagai, kokam, fulsar,malsamot, ninaidhodh
			Oreades	Dead and decomposed part	Sagai, kokam
			haematocephalus	Dead part of small wood or leaves	Sagai, kokam, dumkhal
			Sicus	Dead leaves	Sagai, kunbar, fulsar
			Rotula	Dead bark and leaves	Sagai, kokam, fulsar, kunbar
			epiphyllus	Tectona grandis leaves mid rib.	Sagai, kokam, fulsar, nigat
10	Meruliaceae	*Podoscypha*	*multizonata*	Dead stem	Malsamot,Shoolpaneshwar Wildlife Sanctuary
11	Nidulariaceae	*Cyathus*	*Striatus*	Decomposing part of wood	Navagam, malsamot
			Olla	Decay of cow dung	Timbapada,Shoolpaneshwar Wildlife Sanctuary
			stercoreus	Decomposing part of cow dung wall	Timbapada, malsamot
12	Phallaceae	*Phallus*	*impudicus*	Decomposed par soil	Dediapada, korvi
		lleodictyon	*cibarium*	Soil	Saribar, Kunbar, Kokam, Dumkhal, Sagai, Devmogra,Fulsar
13	Physalacriaceae	*Strobilurus*	*trullisatus*	Dead part of leaf or wood	Sagai, saribar
			tenacellus	Dead part of leaf or wood	Sagai, malsamot, kokam
			albipilatus	Dead part of leaf or wood	Saribar, ghatoli
14	Pleurotaceae	*Pleurotus*	*pulmonarius*	Dead part of wood or stem	Sagai
			ostreatus	Dead part of wood or stem	Fulsar, vandri, kokam
			Dryinus	Dead part of wood or stem	Kokam

15	Pluteaceae	*Pluteus*	*Cervinus*	Dead and decomposing stem	Sagai, kokam, fulsar
			salicinus	Dead and decomposing stem	Kokam, fulsar, saribar
			petasatus	Decomposed part	Devmogra, Shoolpaneshwar Wildlife Sanctuary
16	Psathyrellaceae	*Parasola*	*plicatilis*	Soil	Fulsar, Shoolpaneshwar Wildlife Sanctuary
			Lacteal	Soil	Navagam,Shoolpaneshwar Wildlife Sanctuary
		Coprinellus	*Lobatum*	Decomposed part	Kokam, fulsar, saribar
			meredithiae	Decomposed part	Devmogra,
			plicatilis	Decomposed part	Near surpaneshwar sanctury
		Coprinopsis	*Cinereal*	Cow dung	Sagai, kokam, fulsar, nigat
		Cystoagaricus	*trisulphuratus*	Dead and decomposed part	Netrang,Shoolpaneshwar Wildlife Sanctuary
		Psathyrella	*candolleana*	Soil	Near surpaneshwar sanctury
		Coprinus	*xanthotrix*	Decomposed part	Dumkhel
			Comatus	Cow dung	Dumkhel
		Parasola	*plicatilis*	Decomposed part	Kokam, Dumkhal, Sagai, Shoolpaneshwar Wildlife Sanctuary
17	Repetobasidiaceae	*Cotylidia*	*diaphana*	Dead part of stem	Sagai, saribar
18	Thelephoraceae	*Thelephora*	*Palmata*	Dead stem	Saribar
19	Tricholomataceae	*Lepista*	*Nuda*	Soil	Saribar, Tabda, Kokam, Dumkhal, Sagai, Devmogra,Fulsar