

Study of Fungal Diversity of Regions with Anthropogenic Activity in some Green Zones of MMRDA Region

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Article Info	Abstract
<p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Vaidya Sharda, Karangutkar Manasi P, Chorge Sachin V, Kadam Priyanka (2015) Study of Fungal Diversity of Regions with Anthropogenic Activity in Some Green Zones of MMRDA Region, <i>Int. J. of Life Sciences</i>, Special Issue, A4: 57-61.</p> <p>Acknowledgements: The research team is thankful to Green line Organisation for providing funds for this study under 'Green Lead' Environmental Fellowship Programme For University Students and Young Professionals. We are also thankful to Mr. Kubal A, Director MNP; Forest official of SGNP, Karnala Sanctuary, Matheran forest and Dr. Shubhalaxmi, Centre Manager CEC BNHS for providing access to the forest land and allowing to conduct our investigations.</p> <p>Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>Abstract</p> <p>The kingdom fungi includes organisms that are saprophytic or parasitic. These life forms make an important tropic level of our ecosystem highly important in nutrient recycling. The current study focuses on fungal diversity in some green zones of MMRDA region with anthropogenic activity. The study also focuses on fungi associated fauna to find relation if any. The 26 species of Macrofungi and 20 species of soil fungi have found. The study shows that the fungal diversity in zones with limited or restricted human activity is high. An Arthropodan fauna is more associated with fungi for food. Also the diversity of fungi may depend on the plant community and soil factors, human interference such as monoculture and soil pollution may cause changes in fungal diversity of protected forest.</p> <p>Key words: Fungal biodiversity associated Fauna, <i>Aspergillus</i>, Soil fungi, MMRDA region.</p> <p>INTRODUCTION</p> <p>There is deep association of forest community, ecological structure and fungi. Fungi provide very basic and essential services to nature including nutrient recycling, food for animals, shelter, population control of animals etc. So at one point of view to the forest community the fungi take a centre position. There are many studies conducted in relation to ecology of flowering plants and other life forms by keeping them at centre stage. But such view of study towards fungi is used by very few investigators. In the present study the fungal species found in green zones of Mumbai and surrounding regions are identified and enlisted. The data is then compared with available faunal diversity which depends on various types of fungi for food, shelter or any other association.</p>

MATERIALS AND METHODS

The study sites were selected within Mumbai and nearby regions (MMRDA region). Four sites were selected viz. Sanjay Gandhi National Park (SGNP)(19°09'47"N 72°53'31"E), Mahim Nature Park (MNP) (19°03'08"N 72°51'46"E), Matheran (MTR) (18°58'50"N73°16'15"E) and Karnala forest (KRN) (18°53'37"N 73°07'01" E). The study sites were visited once a quarter (considering season of three months) from October 2012 to September 2013. The data was collected along the 2 km transect in area where human activities are quite high. The data was collected in about 5 meter distance on both side of transect. During field visits study team photographed and collected fungal specimens as per the standard methods. (Atri and Saini, 2000). Also the observations were recorded for faunal association if any. The soil samples were also collected during field visit to study microfungi in laboratory.

The identifications of macrofungi were made using available literature for fungal taxonomy such as Evans and Kibby, (2004), Christensen,

(1960) and Smith (1960; Sathe and Deshpande, 1980; Thite and Patil, 1976). The identification was done by-

1. Culturing them on PDA (as per Difco Manual, 1969) by soil dilution technique. (Warcup, 1967; Pramer and Schmidt, 1966).
2. By preparing the slides stained in cotton blue in lactophenol and
3. By comparing it with the standard literature. (Nagmani et al, 2006).

RESULTS AND DISCUSSION

This study was focused on collecting species diversity data of fungi mainly found in regions of forest where anthropogenic activities are quite high. 25 species of Macrofungi and 9 species of soil fungi have been found in SGNP. Matheran and MNP have comparatively less species diversity in macrofungi and harbour 8 species soil fungi. The data shows that the species diversity of SGNP is higher as compared to other three regions. The diversity of soil fungi in all three regions indicates good health of forest soil around reclaimed area.



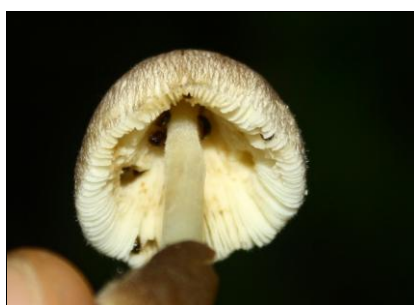
Dipteranflies on *Lepiotasp.*



Beetles on *Lepiota sp.*



Fungal growth on caterpillar body



Beetles on fungal body



Flies on *Dictyophora sp*

Table I: List of region-wise fungal species.

S.N.	Fungus Species	SGNP	MNP	MTR	KRN	Can be collected in
1	<i>Agaricus</i> sps.	Jun.13, Aug.13	-	July13	Aug.13	June, July, August and if rains persist, in september
2	<i>Agrocybe</i> sps.	Jun.13, Aug.13	-	-	Aug.13	Same as above
3	<i>Auricularia</i> sps.	Aug12, Jun.13	-	-	Jun.13	Same as above + in dried forms after rainy season
4	<i>Cantherellus</i> sps.	Jun.13	-	-	-	In rainy season
5	<i>Coltricia</i> sps.	Oct.11, Dec.12, Jun.13, Aug13	Oct.12	-	Jan.13,	Grows in rainy season but persists throughout the year
6	<i>Coprinus</i> sps.	July12, Jun.13, Aug.13	Oct.12	-	-	Rainy season
7	<i>Coriolus</i> sps.	Oct.11, Aug12, Dec.12	-	July13	Jan.13	Grows in rainy season but persists throughout the year
8	<i>Dedalia</i> sps.	Oct.11, Aug13	-	-	-	Grows in rainy season but persists throughout the year
9	<i>Dictyophora indusiatus</i>	July13	-	July13	July13	Only in early rainy season
10	<i>Ganoderma</i> sp.	Aug13	-	-	Aug13	Grows in rainy season but persists throughout the year
11	<i>Ganoderma aaphanatum</i>	-	-	-	Jan.13	Grows in rainy season but persists throughout the year
12	<i>Geastrum</i> sps.	Aug.13	-	July13	-	Late in rainy season
13	<i>Hydropus</i> sps.	Sept.11, July12, Jun.13, Aug13	-	-	-	Rainy season
14	<i>Hypoxylon</i> sps.	Oct.11, Dec.12	-	-	Oct.11	Rainy season May persist even after.
15	<i>Lapiota</i> sps.	Sept.11, July12	-	-	July12	Rainy season
16	<i>Lycoperdon</i> sps.	Sept.12	-	-	-	Rainy season
17	<i>Marasmius</i> sps.	Sept.11, July12, Aug12, Sep12, Jun.13	-	-	Jan.13	Rainy season
18	<i>Mycena</i> sps.	July12, Jun.13	-	-	-	Rainy season
19	<i>Phellinus</i> sps.	Aug 12,	-	-	Aug 12	Grows in rainy season but persists throughout the year
20	<i>Pleurotus</i> sps.	Oct.11, Jun.13, Aug13	-	-	-	Rainy season + if moisture is present in winter also
21	<i>Psathyrella</i> sps.	Jun.13	-	-	-	Rainy season
22	<i>Schizophyllum</i> sps.	Aug13	-	-	-	Rainy season
23	<i>Teratomyces</i> sps.	Oct.11	-	-	-	Grows in rainy season but persists throughout the year
24	<i>Thelephora</i> sps.	Aug 12,	-	-	Aug 12,	Grows in rainy season but persists throughout the year
25	<i>Volvariella</i> sps.	July12, Aug.13	Oct.12	-	July12,	Rainy season + if moisture is present in winter also
26	<i>Xylaria</i> sps.	Oct.11, July12, Dec.12, Jun.13	-	-	Jan.13	Can be found almost thorough out the year but grows well in rainy season

Table 2: List of soil fungi at study sites

Site	Name of the Fungus	Site	Name of the Fungus
SGNP	1. <i>Aspergillusniger</i>	MTR	1. <i>Aspergillusniger</i>
	2. <i>Abisidiaglauca</i>		2. <i>Aspergilluscandidus</i>
	3. <i>Aspergillusflavus</i>		3. <i>Aspergillusfumigatus</i>
	4. <i>Aspergillusterreus</i>		4. <i>Aspergillusochraceous</i>
	5. <i>PenicilliumChrysogenum</i>		5. <i>Chrysosporiumasperatum</i>
	6. <i>Penicilliumdecumbens</i>		6. <i>Fusariumsolani</i>
	7. <i>Penicilliumnautatum</i>		7. <i>Paecilomycesvariotti</i>
	8. <i>Rhizopusstolonifer</i>		8. <i>PenicilliumChrysogenum</i>
	9. <i>Syncephalastrumsp</i>	KRN	1. <i>Aspergillusniger</i>
	10. <i>Trichodermaviride</i>		2. <i>Aspergillusnidulans</i>
MNP	1. <i>Aspergillusniger</i>		3. <i>Chaetomiumsp.</i>
	2. <i>Aspergillusterreus</i>		4. <i>Cladosporiumsphaerospermum</i>
	3. <i>Chrysosporiumasperatum</i>		5. <i>Curvularialunata</i>
	4. <i>PenicilliumChrysogenum</i>		6. <i>Curvulariapallescens</i>
			7. <i>PenicilliumChrysogenum</i>

Table 3: The faunal diversity recorded on fungal body

Sr. No.	Fungus Name	Fauna recorded
1.	<i>Lepiota.sp</i>	Small Beetles Coleoptera
2.	<i>Auriculariasps.</i>	Insect like arthropods.
3.	<i>Dictyophorasps.</i>	Dipteran Flies and beetles (Diptera and Coleoptera)

The species diversity of macrofungi is indicative of forest rich in higher plant species diversity (Marcel et al, 1998). As per the present investigations, the higher the plant diversity higher is the faunal diversity.

Many researchers such as Dar et al (2010) in case of conifer dominated forests of Kashmir, Beig et al (2011) From Jammu and Kashmir, Bhatt et al (2014) in case of Adwani forests of Garwal Himalaya, Uttarakhand, Upadhyayet al (2005) in case of dark spored Agarics from North Western Himalaya, have carried out biodiversity studies of macrofungi. The work by all the above authors indicates the vast biodiversity of macrofungi in different parts of India. Sangeetha et al (2004) had carried out studies for enhancing the yield of Paddy straw mushroom. Preservation and packaging of milky mushroom was studied by Sohliyaet al, (2010). Cultivation of jelly mushroom

was tried out by Garasiya et al, (2007). The attempts of these authors help in conservation of some of these fungi.

SGNP and Karnala Sanctuary are protected forest areas with restricted or no settlements inside. That may have caused the lower disturbance of forest floor and lower contacts with manmade waste and chemicals. The Matheran though part of protected forest it is highly disturbed due to anthropogenic activities. It was also found that the soil in and around Matheran region is highly mixed with horse and mule dung. That might have favoured certain species of fungi to thrive in soil. MNP has quite less disturbed forest floor but it is a manmade forest. The plant diversity and dominance pattern here is different than the natural forests. The dominant species of MNP were *Samania saman* (Fabaceae), *Pitho colobium dulci* (Fabaceae) and *Ficus benjamina* (Moraceae).

Also the land of MNP was used as dumping ground previously. Adding to this, the highly polluted Mithi rivers demarcates northern boundary of forest. This might have affected the fungal species diversity in this region. Still the team recommends detailed study of MNP forest for its soil fungi and macrofungal biodiversity to understand relations and interactions.

The Faunal diversity on fungal body majorly comprises of Arthropodan animals. The dipteran flies and coleopteran beetles are found majorly feeding on fungal body. Ants and small Arthropodans were also recorded but the purpose of their activity could not be identified.

CONCLUSION

The forests in the MMRDA region are the rich sources of fungal biodiversity. They are getting disturbed by human activities. The activities of human beings should be directed towards conservation of these species. A large number of faunal species are associated with fungi for various purposes. The protection of fungal species in turn protects the faunal diversity and balances the ecosystem.

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