



DIVERSITY OF SOIL FUNGI IN SCRUB JUNGLE AND DECIDUOUS FOREST OF LAKKYA VILLAGE, CHIKKAMAGALURU KARNATAKA.

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Abstract: Fungi are the most important diverse group of eukaryotic organisms which plays a valuable basic role in the forest ecosystem to enrich the above ground biomass production in nutrient cycle as decomposer. Soil fungi occur in different forms ranging from unicellular to much branched septate or aseptate filamentous structure. In the soil the diversity of fungal forms mainly depending upon the environmental factors like pH, temperature, moisture content, organic matter, soil atmosphere and nutrients. In the present work we aimed to study the isolation of fungi in unexplored forest soils in terms of percent occurrence and frequency and its relationship with physicochemical properties in scrub jungle and deciduous forest of Lakky village, Chikkamagalur district. The study was conducted during 2019. For the isolation of fungi fifteen samples were collected randomly from 0-15 cm depth after removing the surface soil, from different sites of the forest. Serial dilution methodology and PDA media was used for isolation. A total of 442 colonies were obtained from fifteen soil samples belonging to eighteen genera and forty spp. Among them twenty seven species belongs to the class Deuteromycetes, Seven Zygomycetes, Four Ascomycetes, one Oomycetes and Chytridomycetes each. The highest percent occurrence showed by *Aspergillus niger* (26.67%), and lowest percent occurrence showed by *Penicillium digitatum* etc (0.22%). The maximum fungal frequency of *Aspergillus niger* found to be 93.33%, and other species showed minimum fungal frequency of 13.33%. Physicochemical analysis reveals that soil is rich in micro biota due to acidic pH of 5.6 – 6.98, rich organic matter and high moisture content. In conclusion the true purpose of presence of fungi in the nature is in recycling of dead organic matter, thus making them available for the next generation and maintained the ecological balance in the environment.

Key words: Soil fungi, Frequency, Organic matter, Serial dilution, Scrub jungle.

I. INTRODUCTION

Soil is an important abiotic component which plays a major role in sustaining life being habitat for plants and animals. Plants receive nutrients from the soil and shed their dried parts on the soil. Thus soil is the site where nutrient elements are brought into biological circulation by mineral weathering acts as a bridge between organic and inorganic material. Soil fungi are the important part of terrestrial ecosystem. These organisms plays an vital role in decomposition of the dead organic matter, aggregation of soil particles, increases the soil porosity, nitrogen fixation and production of growth stimulating substances, toxins etc. and make the soil suitable for the growth of plants. The forest soil which is devoid of human activity is the major hot spot of microbial biodiversity and harbors fungi as the dominant group next to bacteria. The variety and galaxy of soil fungi and their natural beauty occupy prime place in the biological world and India has been the cradle for such fungi (Crous *et.al.* 2006). Out of 1.5 million estimated fungi only 50% were characterized. Only of fraction of hidden wealth has been subjected to scientific survey and Mycologist has to unravel the unexplored hidden wealth (Manoharachary. 2005). So in the present study an attempt will be made to investigate the soil mycoflora of undisturbed soils of scrub jungle and dry deciduous forest of study Lakky village, Chikkamagalur dt..

I. MATERIALS AND METHODS

2.1 Study area

The study area Lakkya village is situated ten km away from Chikkamagaluru is unique in having diverse kind of forest like scrubby forest, thorny dry deciduous forest, moist deciduous forest, semi evergreen and shola vegetation. It is situated between 12° 54' 42" and 13° 53' 53" north latitude and between 75° 04' 46" and 76° 21' 50" east longitude. The terrain is flat with scrub jungle and deciduous forest. The forest plot includes maximum species of *Eucalypts lanceolatus*, *Cassia fistula*, *Cassia auriculata*, *Lantana camara*, *Toddalia asiatica*, *Accacia auriculiformis*, *Clerodendron sp*, *Canthium sp*, *Crotolaria sp*, *Albizia odoratissimum etc* (Fig.1). In Lakkya village during summer the temperature remains maximum 31 to 34° c and reaches minimum of 18 to 21° c. During winter the temperature reaches a maximum of 21 to 23° c and minimum of 14 to 17° c. During rainy season the temperature reaches a maximum of 25 to 29° c and minimum of 18 to 20° c. Average rain fall is 600 - 750 mm (mini) and maximum of 1650mm. Wind velocity is 2- 4km/hour , atmosphere pressure is 1489.8 - 1516 millibars and RH is minimum of 40 - 50 % and maximum of 60 %.



Fig.1. Study site map A – B and A view of study area C-D.

2.2. Isolation of soil fungi

Soil samples were collected during 2019 randomly from five different sampling sites (Three samples from each site) at the depth of 0-15cm after removing the surface layer in a sterilized polythene glass jars and brought to the laboratory for isolation of fungi and physicochemical analysis. Isolation of soil fungi from the soil samples were enumerated by serial dilution method (Waksman, 1927). Cultures were maintained at incubation chamber for 3-5 days at 20° – 25° c. Isolated fungi were identified on the basis of colony morphology by using relevant literature (Nagamani, .et.al 2005). The obtained data was presented in terms of percent occurrence and frequency (Subha..et.al.2013).

II. RESULTS AND DISCUSSION

During our investigation period a total of 442 colonies were obtained from fifteen samples belonging to 18 genera and 40 spp. Among these 27 belongs to class Deuteromycetes, seven Zygomycetes , four Ascomycetes , one sp. of Oomycetes and chytridomycete and also with four non sporulating species. (Table.1., Fig.2) In the present study the species of *Aspergillus* are not only dominant but also common in all soil samples. These observations in the present study are similar to Ganawane and Deshpande(1972), Reddy.et.al.(1987), Monaharachary. et. al (1990) who have reported that *Aspergillus* occurs more frequently than *Penicillium* in warmer climate and it occurs on all sorts of organic debris (Rane and Gandhe.2006).

Soil analysis results in the present study showed that pH value was acidic in all the samples ranging from 6 - 6.98. Manoharachary (1976) reported significant correlation between the fungal numbers and pH in scrub jungle and soils which is rich in organic matter showed the presence of a great variety of fungal sp. Fungal flora may vary depends on its native soils (Shi.et.al 2002). The organic carbon content of the soil found to be 1.09 -1.17%, available nitrogen shown slight variation in the range from 310 – 330ppm, available phosphorus 2.4 – 3.6 ppm, Potassium 25 – 58 ppm, Calcium 9.45 – 14.7 %, magnesium 7.87 – 2.63 , Sulphur in traces and texture of soil found to be silt and clay with high water holding capacity and moisture content ranging from 5.10 - 6.8 favors the growth of fungi. Distribution of soil fungi depending upon the nature of the organic content, climatic condition, surface vegetation and soil texture (Waksmann. 1944, Marchner. et.al,2003). The percent occurrence of individual species to the total fungal population showed variation. The maximum percent occurrence showed by *Aspergillus niger* with 26.69% and least percent occurrence shown by *Tritirachium dependens* showed 0.22%. The maximum percentage of fungal frequency of *Aspergillus niger* was found to be 93.33% and the minimum fungal frequency and percentage showed by *Absidia repens*, *Allomyces anamolus*, *Tritirachium dependens* showed 6.66 %. We have isolated more number of deuteromycetes species followed by zygomycetes and ascomycetes. Variation in distribution fungal groups due to the different types of colonies that appeared in the initial stages of decomposition gradually disappeared and were replaced by new colonies in the later stages were efficient degraders of cellulose and lignin(Senthikumar et al., 1993). *Penicillium*, *Cladosporium* and *Trichoderma* are commonly known as late-stage colonies in decomposing litter (Osono and Takeda, 2007). Earlier reports indicated that these genera appeared abundantly in Indian soils dominating both in the frequency and relative density (Bhagath and Pan, 2010) and plays important role in leaf litter decomposition (Panda et al., 2009). Domination of these saprobic fungi indicate faster decomposition and recycling of dead organic materials and leaf particles, hence maintain soil nutrient status (Baath., 1981) and this may be the reason for domination of Deuteromycetes in all the study area..

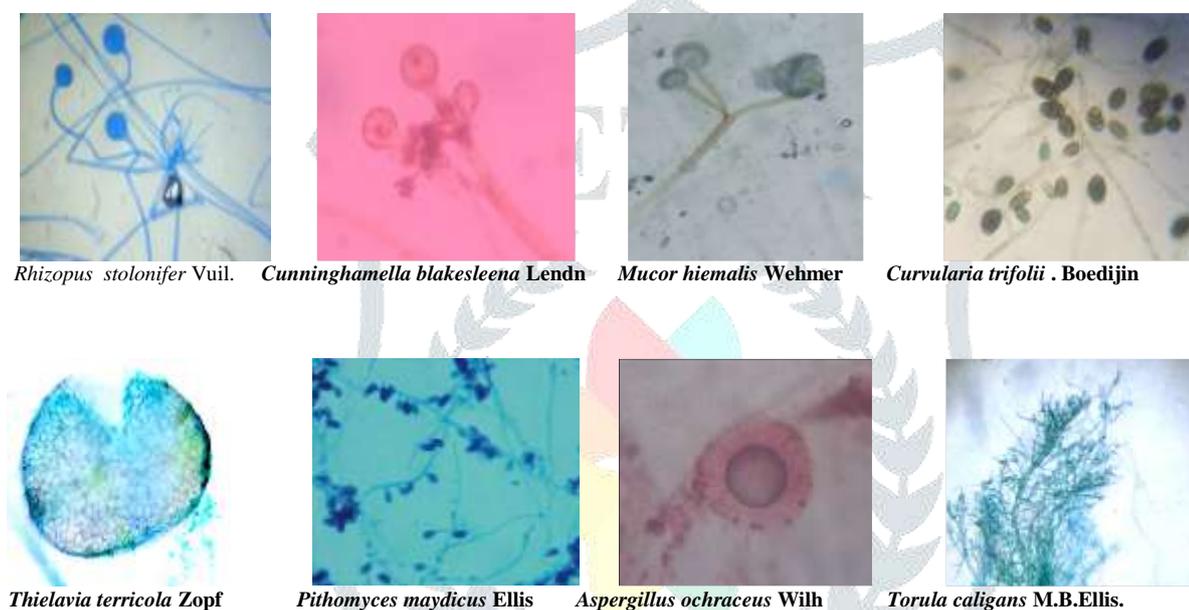
Table1. List of fungi with total number of colonies, percent occurrence and frequency in Lakky Village. Chikkamagaluru (Dt)

Name of the fungus	TNC	% Occurene	% Frequeny	Name of the fungus	TNC	% Occurene	% Frequeny
Oomycetes				Deuteromycetes			
<i>Pithomyces maydicus</i>	01	0.22	6.66	<i>Aspergillus niger</i>	118	26.69	93.33
Chytridiomycetes				<i>Aspergillus ruber</i>	02	0.45	6.66
<i>Allomyces anamolus</i>	01	0.22	6.66	<i>Aspergillus terreus</i>	02	0.45	6.66
Zygomycetes				<i>Aspergillus ochraceous</i>	02	0.45	13.33
<i>Absidia fusca..</i>	03	0.67	13.33	<i>Aspergillus versicolor</i>	19	4.97	20
<i>Absidia repens</i>	06	1.35	6.66	<i>Cladosporium sphaerospermum</i>	06	1.35	6.66
<i>Cunninghamella blakesleeana</i>	09	2.94	20	<i>Fusarium oxysporum</i>	05	1.13	13.33
<i>Cunninghamella echinulata</i>	04	0.90	6.66	<i>Aureobasidium pullulans</i>	01	0.22	6.66
<i>Rhizopus stolonifer</i>	22	4.97	33.33	<i>Chaetosphaeria talbotti</i>	12	2.71	13.33
<i>Mucor hiemalis</i>	01	0.22	6.66	<i>Graphium penicillioides</i>	02	0.45	6.66
<i>Mucor varians</i>	10	2.26	33.33	<i>Penicillium aurantiogriseum</i>	02	0.45	6.66
Ascomycetes				<i>Penicillium digitatum</i>	02	0.45	6.66
<i>Chaetomium homopilatum.</i>	03	0.67	6.66	<i>Periconia macrospinosa</i>	12	2.71	6.66
<i>Curvularia trifolii Serie.</i>	10	2.26	6.66	<i>Phoma glomerata</i>	01	0.22	6.66
<i>Setosphaeria rostrata</i>	01	0.22	6.66	<i>Torula caligans</i>	01	0.22	6.66
<i>Thielavia terricola</i>	01	0.22	6.66	<i>Torula herbarum</i>	13	2.94	13.33
Deuteromycetes				<i>Trichoderma fertile</i>	09	2.03	20
<i>Aspergillus candidus</i>	04	0.90	6.66	<i>Trichoderma viride</i>	18	4.07	33.33
<i>Aspergillus clavatus</i>	24	5.4	20	<i>Trichoderma aureoviride</i>	23	5.25	13.33
<i>Aspergillus deflectus</i>	07	1.58	6.66	<i>Trichoderma harzianum</i>	05	1.13	13.33
<i>Aspergillus flavipes</i>	02	0.45	13.33	<i>Tritirachium dependens</i>	01	0.22	6.66
<i>Aspergillus flavus</i>	15	3.39	26.6	NSF	47	10.63	46.66
<i>Aspergillus fumigatus</i>	02	0.45	6.66	Un identified	01	0.22	6.66

Table.2. Physicochemical parameters of Scrub jungle and deciduous forest of Lakky Village. Chikkamagaluru (dt).

Parameters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
pH	6.98	6.86	6.62	6.76	6.01
Electrical conductivity ds/m	0.10	0.075	0.054	0.065	0.044
Nitrogen kg ha ⁻¹	310	312	330	314	331
Phosphorus kg ha ⁻¹	2.4	3.6	3.0	2.4	3.6
Potassium kg ha ⁻¹	58	35	25	58	32
Calcium ppm	14.7	13.65	9.45	14.9	12.65
Magnesium ppm	1.57	2.63	7.87	2.33	7.07
Sulphur kg ha ⁻¹	Tr	Tr	Tr	Tr	Tr
Organic carbon %	1.17	1.10	1.09	1.18	1.14
Texture	Silt , Clay				
Moisture content %	6.8	5.10	5.15	6.8	6.9

Fig.2. Isolated fungal species



IV. CONCLUSION

In conclusion Fungi in nature encounter the micro and macro nutrients from the source, but rather preferentially select from what is available. Hence different groups of soil fungi thrive well in withstanding all sort of environmental and nutritional condition in the **scrub** jungle and deciduous forest of Lakky village.

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