

ISOLATION, IDENTIFICATION AND SEASONAL DISTRIBUTION OF SOIL FUNGI IN ACHANAKMAR BILASPUR

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ABSTRACT

Achanakmar reserve forest is well known biosphere reserve forest of Chhattisgarh. Present study was carried out to the seasonal distribution of fungal flora, their isolation, identification in soil of Achanakmar reserve forest of Bilaspur (C.G.). The maximum fungal population was obtained in winter season followed by rainy and summer season. Species of *Aspergillus*, *Mucor*, *Rhizopus*, *Fusarium*, *Penicillium* were recorded as dominant fungal species where as *Nigrospora*, *Glomus* species are also recorded during observation period. There is no specific trend were found in relation to physico-chemical population of soil and fungal distribution pattern.

KEYWORDS: Fungal Distribution, Seasons

Soil was not an interest static material but it is a medium pulsating with life. Actually soil is dynamic structure, inhabiting various diverse groups of microorganism. Most important amongst them are bacteria, Actinomycetes, algae, fungi and protozoans. These microorganisms are fundamental for soil ecosystem and their Function Warcup 1951. Microfungi plays a focal role in nutrient cycling by regulating biological activity. The member and kinds of microorganism present in soil depends on many environmental factors such as types and amount of nutrients, moisture, aeration in soil, pH, temperature. Hence the fungal hyphae physiologically bind soil particles together. Creating stable aggregation that help increase water infiltration and soil water holding capacity. Soil fungi can be grouped into three general functional classes i.e; decomposers, Mutualists, and pathogens. The decomposers are responsible for the breakdown of dead organic nutrients. Mutualists fungi will colonize plant -roots and provide nourishment to the plant in exchange of carbon. The pathogens cause disease when they colonize and feed on living organism. The present investigation was undertaken for the isolation of fungi in year 2014-2015 in soil surface of Achanakmar forest Bilaspur C.G. An extensive work has been done on the forest soil fungi in India, Gilman 1959, Saxena and Sarabhoy 1964, Dwivedi 1965, Deshpandey and Deshpandey 1966, Manohachari 1977, Mohanty and

Panda 1944, Tiwari 2002, Tilak 2000, Rene and Gandhe (2003) in Chhattisgarh Tiwari et. al; 2006. Kulkarni 2011, Yadav et. al ;2011, Pandey and Chauhan (2014).

MATERIALS AND METHODS

The studied were carried out in the natural mixed deciduous forest in which sal mixed Bamboo, Tendu, grasses were found dominantly. In Achanakmar, Bilaspur district. The soil type is known as black cotton soil. The soil samples were collected from compartments no 1094, and compartments no 1094. Soil sample were collected from 0-15 cm depth after scraping the upper surface of soil layer by means of sterilized augur every month. Three soil sample taken from each study site and make a composite soil sample. The samples were brought to the laboratory. The samples were processed in an isolation process of fungi using soil-dilution plate method. Physico-chemical analysis was done. The fungal isolates were transferred to sterilized plates for purification and identification. Czapek Dox Agar, PDA and Lactose Yeast extract agar nutrient media was used. The grown fungi were mounted on a slide stained with lactophenol-Cotton blue to detect fungal structure. Then covered with a cover slip, examined under microscope and identified on the basis of their colony morphology and spore characterization. The texts used for identification of soil fungi Barnet 1962, Gilman 1966.

Table 1: % frequency of fungal population at study sites in different season

S. N.	Fungal species	Rainy season	Winter season	Summer season	Total colonies	% Frequency
1	<i>Aspergillus candidus</i> Link.	20	21	12	53	6.23
2	<i>A. flavipes</i> Toom Church	06	19	05	30	3.52
3	<i>A. glucus</i>	4	4	5	13	1.52
4	<i>A. niger</i> Van Tigheur	38	38	21	97	11.41
5	<i>A. nivens</i> Blochwitz	5	12	04	21	2.47
6	<i>A. terreus</i> Thom.	6	10	03	19	2.23
7	<i>Absida orchidis</i> Hagen.	04	09	02	15	1.76
8	<i>Alternaria alternate</i>	20	35	10	65	7.64
9	<i>Chaetomium fussisporle</i> Rai and Mukhergee	2	2	2	6	0.70
10	<i>Cladosporium spp.</i>	3	7	12	22	2.58
11	<i>Curvularia lunata</i> Boedijn	13	23	09	45	5.29
12	<i>Fusarium oxysporum</i> Schl. ex. Fries	23	20	7	50	5.88
13	<i>Fusarium solani</i>	24	35	4	63	7.41
14	<i>Glomus sps</i>	6	17	10	33	3.88
15	<i>Helminthosporium spp</i>	7	9	5	21	2.47
16	<i>Humicola grisea</i> Traaen	7	9	3	19	2.23
17	<i>Hypomyces spp.</i>	4	4	2	10	1.17
18	<i>M.racemosus</i> Fresinius	2	31	12	45	5.29
19	<i>Monilia sitiphila</i> (Mont)Sacc	9	6	1	16	1.88
20	<i>Mucor stolinifer</i>	22	10	4	36	4.23
21	<i>Mycelia sterilia</i>	07	14	05	26	3.05
22	<i>Nigrospora spp.</i>	4	1	1	6	0.70
23	<i>Penicillium citrinum</i> Thom.	18	22	7	47	5.52
24	<i>Rizopus solani</i> Kuhn.	10	10	4	24	2.82
25	<i>Rizopus spp.</i>	12	17	09	28	3.29
26	<i>Torula spp.</i>	6	23	5	34	4.00
27	<i>Trichoderma viridae</i> Perse And Fries	2	3	1	6	0.70
		284	411	165	850	

Table 2: Population status of micro flora in soil of Achanakmar forest Bilaspur 2015-2016

	Jan	Feb	Mar.	April	May	June	July	Aug	Sep.	Oct.	Nov.	Dec.
Mean value of Fungal Population	45.3 %	39.8 %	28.4 %	17.66 %	11.31 %	7.29 %	19.92 %	31.6 %	47.1 %	58.8%	58.2	41.00

Table 3: Physico – Chemical Properties of soil of Achanakmar forest Bilaspur

	Water holding capacity	Organic carbon %	Total Nitrogen %	Phosphorus mg/100gm	Potassium / 100gm	pH
Winter December-Febraury	15.48	1.12	0.94	0.94	1.5	5.60
Summer March -June	12.22	1.12	0.83	0.97	1.10	5.52
Rainy July-September	17.60	0.90	0.31	0.95	1.10	6.5

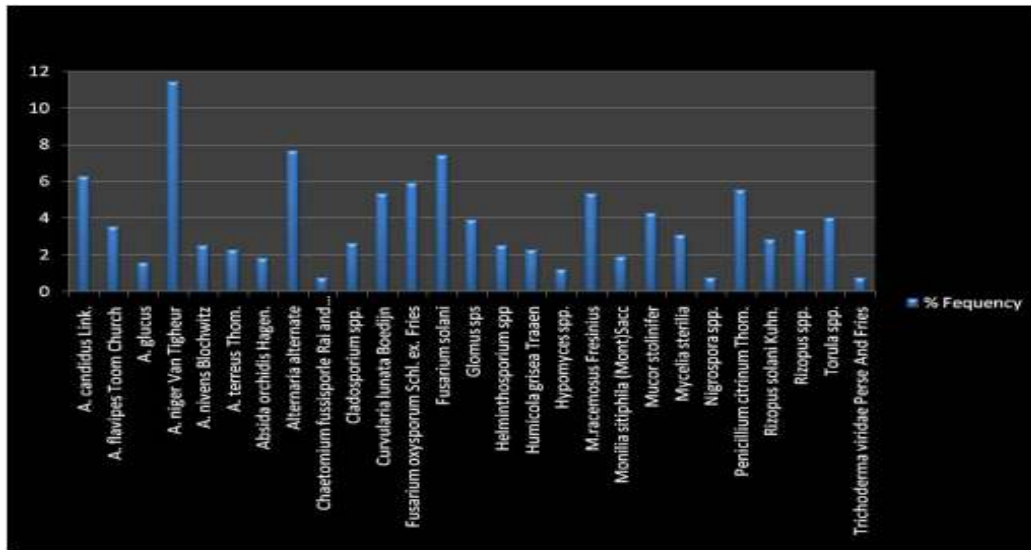


Figure 1: % frequency of fungal population at study sites.

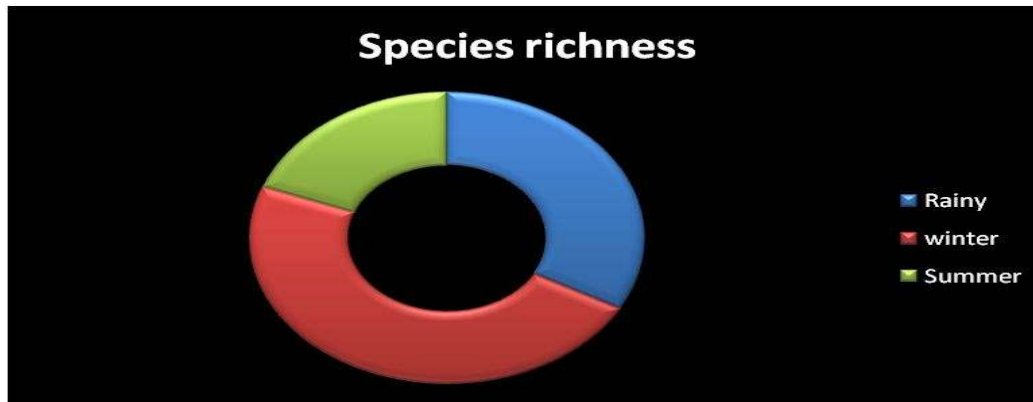


Figure 2: Season wise Fungal Species richness in soil of Achanakmar forest

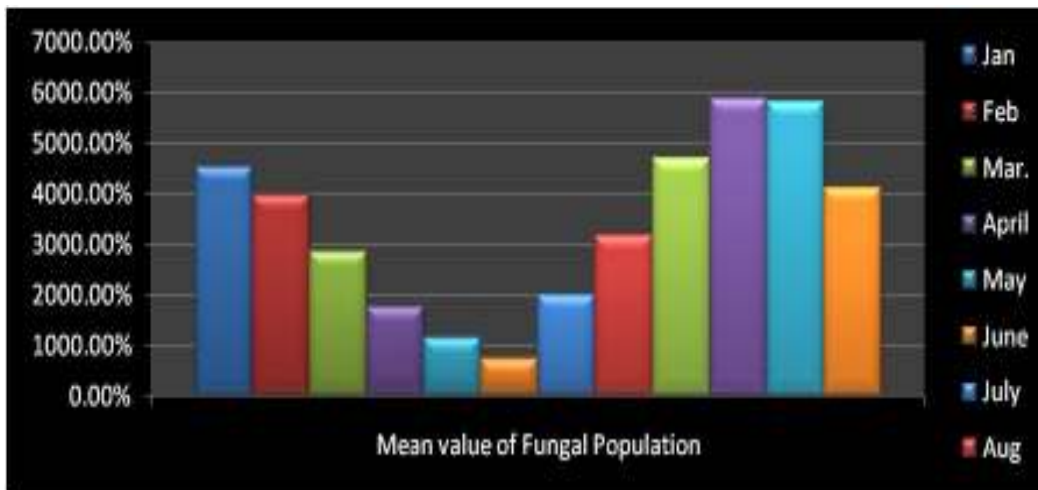


Figure 3: Population status of micro flora in soil of Achanakmar forest Bilaspur 2015-16

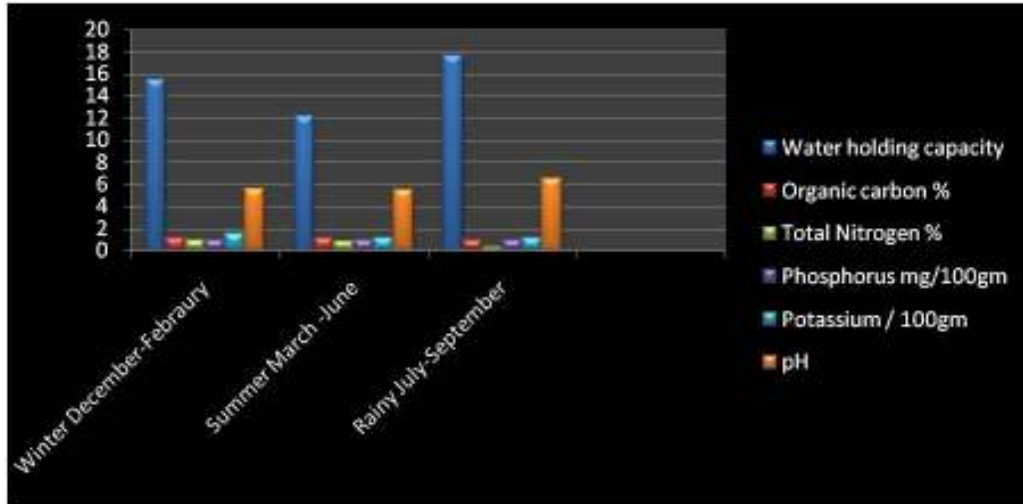


Figure 4: Physico – Chemical Properties of soil of Achanakmar forest Bilaspur



P. citrinum .

M.racemosus

M. stolinifer

C. lunata



F. oxysporum



Nigrospora spp.



T. viridae



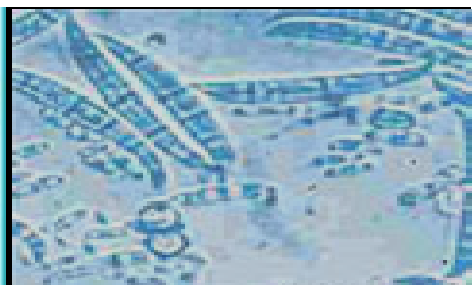
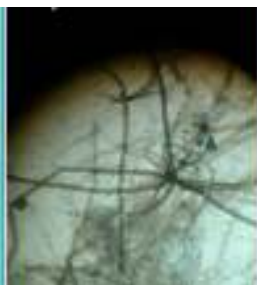
A. niger



Nigrospora spp.



Rizopus spp.



F. oxysporum



Cladosporium spp.

C. lunata

Alternaria alternate

M. stolinifer

RESULTS AND DISCUSSION

During study period 27 fungal species isolated from soil samples of Achanakmar forest Bilaspur. The most frequent genera isolated were *Aspergillus* (6 spp) and *Mucor* (2 spp.), *Rhizopus* (2 spp.), *Fusarium* (2 spp.), followed by *Alternaria*, *Curvularia*, *Penicillium*, was found throughout the year. *Mycelia sterilia* also found throughout the year during investigation period. While *Trichoderma*, *Cladosporium*, *Chaetomium*, *Nigrospora*, were obtained in lesser frequency in forest soil of Achanakmar Bilaspur. Earlier reports also indicates that *Aspergillus* and *Penicilum* were most dominant in forest soil. Similar findings were observed by us accept *Penicillium* which is in fourth position in frequency rate.(Table1 & Figure,1)

Frequency wise distribution of fungal flora in different season revealed that maximum spore counts were observed in winter season followed by summer season which fluctuations with moderate temperature and humidity in both environment and soil forms. Yasmien and sexena 1992 recorded maximum fungal spore during September in different localities at Aligarh, Begum and Ahamad 2006 reported gradual increase in the number of fungal spores from September to January and distributed to gradual decrease with temperature. (Table 2 & Figure 2)

The frequency of fungi is influenced by soil structure, soil- vegetation, water holding capacity, ph, and available carbon, nitrogen and potassium. Soil is a natural nutrient medium for microbial population. In summer season the nutrient depletion and dryness of soil reduce the spore population, where as very moist condition certain fungus i.e; *Nigrospora spp.*, *Monilia sitiphila*,

Hypomyces spp. shows their sporulation and colonization. (Table 3 & Figure 3)

It is interesting that the *A. niger* (11.41 %), *A. alternate* (7.64%), *F. solani* (7.41%), *P. citrinum* (5.52%) *F. oxysporum* (5.41%) *M. racemosus* (5.29%) reported always with higher frequency rate in all season. It is believed that due to their wild tolerance capacity to different climatic condition Pandey and Chauhan 2014. *A.niger*, *F.solani*, *F. oxysporum*, *P. citrinum*, *A. alternate*, *M. racemosus*, *C. lunata* sporulate in higher moisture contents in rainy season but maximum frequency and dominant distribution of fungal species recorded in winter season which enhances the growth of fungal population Figure 2 .during investigation species of *Aspergillus*, *Trichoderma viridae*, sps of *Fusarium* and *Curvularia* are well known pathogenic fungi. *Glomus* sps a mycorrhizic symbiotic fungi found in Achanakmar forest Bilaspur. There is no specific correlation were found. The soil fungi distribution and physico-chemical properties of Achanakmar forest. Therefore further investigation will be needed.

CONCLUSION

Presence of soil fungi plays significant role in growth and development of forest vegetation. It is important to note that certain fungi are pathogenic and symbiotic in nature. Occurrence and diversity of fungi directly related to climate and soil condition. Frequency wise distribution of fungal flora in different season revealed that winter season is most favorite season for fungal growth. Less number of fungal are recorded in summer season.

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