

SEASONAL DISTRIBUTION AND PERIODICITY AMONG THE AQUATIC FUNGAL FLORA FROM BAGHAIN RIVER DISTT, BANDA (U.P)

Lavkush vishwakarma & Rajesh kumar srivastava*

*Head, Department of Botany, P.G.College, Atarra, Distt. Banda (U.P)

Abstract- The present study is an attempt made at Baghain River, Distt Banda (U.P.), India to know the Seasonal Distribution and Periodicity Among the Aquatic Fungal Flora From Baghain River Distt, Banda (U.P), during November 2008 to December 2009. Water samples were collected, scanned and were poured in petridishes by adding crystalline penicillin to inhibit the bacterial growth through baiting technique using numerous baits as hempseeds, grains, human nails and dead ants etc. for fungal population. On critical examination, identification and purification of aquatic fungi. It is came to know that some members of Phlyctidiaceae, Rhizidiaceae, Cladochytridiaceae, Chytridiaceae, Megachytridiaceae, Blastocladiaceae, Saprolegniaceae, Pythiaceae and Moniliaceae are laying over there. Maximum number of fungal species was recorded during rainy season while lowest number of fungal species was observed in summer but In autumn season have only rare or few occurrence. In this site dominant species is *Achlya klebsianna* followed by *Saprolegnia diclina*, *Rhizophydium* species, *Nawkowskiella elegans* and *Saprolegnia* species, occurred in the month of August, September, October, and November, i.e. during rainy and autumn seasons. Lowest occurrences of the fungi are *A. cornuta*, *A. oligantha*, *Allomyces arbuscula*, *Blastocladiopsis parva*, *Lamonniera cornuta*, *L. aquatica*, *Protoachlya* species, *R. herderi*, *R. petersenii*, *S. anisospora* and *Spirosphaera* species. Among all of them *Achlya klebsianna* shows maximum frequency. and *A. cornuta*, *A. oligantha*, *Allomyces arbuscula*, *Blastocladiopsis parva*, *Lamonniera cornuta*, *L. aquatica*, *Protoachlya* species, *R. herderi*, *R. petersenii*, *S. anisospora* and *Spirosphaera* species, shows minimum frequency. These recovered fungi were purified and isolated on YPSS and YPG

cultured medium then examined and identified with various relevant literature.

KEYWORDS: - Aquatic Fungi, Diversity, Occurrence, Distribution, water samples and Baghain River

I. INTRODUCTION-

Dictionary of fungi (5th edition), Commonwealth Mycological Institute, Kew, Surrey, Ainsworth and Bisby (1963) defined aquatic fungi as fungi in water or water liable organism. This diverse group of organism also called as aquatic hyphomycetes, fresh water hyphomycetes, water borne fungi, zoosporic fungi (Uniflagellated and biflagellated fungi) and recently known as water moulds. The distribution and seasonal fluctuations of aquatic fungal diversity in relation to various environmental factors and conditions as well as to the geographical regions of world have been intensively investigated by many workers of countries like Gupta A.K. & Mehrotra R.S. (1989), Klick and Tiffany (1985), Khulbe R. D. (1980), Khulbe R. D & Bhargava K. S (1977), Manoharachary C & Rama Rao P (1981), Nasar S.A.K. & Munshi J. D. (1980), Paliwal P.C & Sati S.C (2009), Upadhyay M & Palini U. T (2010), Farida T, EL Hissy and Abdel Rauof M Khalil (1991), and Suberkropp K (1984). Since the taxonomic study of fungi is basic and fundamental to all the branches of science and without the knowledge of systematic and taxonomy, we can not go ahead for applied aspects hence several investigations were dealing with ecological and taxonomic study on aquatic fungi e.g. Chaudhari P.N (1976), Dayal R (1958), Khulbe R. D (1991), Khan M.A (1981), Thakur ji (1970), Sparrow F.K (1968), Mishra, K.C. & R.S. Dwivedi. (1987), Mishra R.P. et al (1990). and Thangamani G (1961). Some workers also focused their attention towards special genera of fungi e.g. *Achlya*, *Saprolegnia*, *Pythium*, *Blastocladiella*, *Allomyces* and new genera *Dictypleiopsis* by Alabi R.O. (1971), Butler. E.G. (1907), Bhargava K.S and Singh B. B (1965), Robertson, G.I. (1980), Johnson et. al. (1975),

Johnson T.W. (1956), Lund, A (1978), Gandhe, R. V. (2006), Seymour R. L. (1970), Coker W.C. (1923), Prabhu Ji. S. K & Srivastva G. C (1977), Mer, G.S. et al. (1984), Sarkar N. and R. Dayal (1983,87). Dick M. W. (1990) and Farkha T. K. and Abdulrahman A.S (2011), Rekha Chauhan (2014).

Nowdays Biodiversity is a burning issue with its advantages and disadvantages, significance, threats and its various affects attracted many researcher on the field of mycology e.g. Ayodhya D Kshirsagar & V.R Gunale (2013), Ch. Ramesh & Vijay kumar (2006), Iqbal, S.H. (1996), Ahire et. al. (2009). Nabakant Singh & Chhetry G.K.W. (2010), Nemade, L.C. , Patil, V.R and Borse, B. D. (2009), Patil S.Y.& Namade L.C.(2010), Richa Dwivedi, Naureen S.Khan & D.K. Srivastava (2012), Rekha chauhan (2014), Suresh H.R et al (2013), and Allison K.warker and Jinx Campbell(2010). This district (Banda) as well as selected water reservoir (Baghain River) was previously explored in the area of medicinal plants,algal diversity, phytoplankton and zooplankton study,and physio- chemical analysis of water. Since this river is untouched for such scientific study (mycological) so the present investigation was envisaged for Seasonal Distribution and Periodicity Among the Aquatic Fungal Flora.

II. MATERIAL AND METHODS–

The district is located in the Chitrakutdham Division of Uttar Pradesh with its headquarter at Banda and lies between Lat. 24° 53' and 25° 55' N and Long. 80° 07' and 81° 34' E. It is bounded in the north by district of Fatehpur in the east by the district of Chitrakut in the west by the district of Hamirpur and Mahoba and in the south by Satna, Panna, and Chhatarapur the districts of adjoining Madhya Pradesh .

Distance covered by district from East to West is 75 Km. And North to South 50 to 60 Km. The district is linked with roadways to all the adjoining districts of Kanpur, Allahabad, Chitrakut, Fatehpur, Hamirpur, Mahoba and the adjoining districts of Madhya Pradesh. The distance between Lucknow (State Capital) to Banda by road is 219 km. The district is named after the headquarters town, Banda, which is said to have derived its name from Bamdeo, a sage mentioned in Hindu mythology as a contemporary of lord Rama. Bamdeo is said to have had his hermitage at the foot of a hill Bambeshwar nearKhutla locality in Banda. There are mainly three rivers in the district namely Ken, Baghain and Yamuna. Baghein is the second important river of this district. Emanating from a hill near Kohari of Panna district, it enters

Banda district at Masauni Bharatpur village (the. Naraini). It flows north-east-ward and at a point separates Banda from the newly created Chitrakutdistrict forming boundaries between Atarra, Baberu and Karrwi tahsils. Continuing north-east it joins Yamuna near Bilas village. It being most capricious in its action, deposite quantities of sand or Kankar shingles, but near its junction with Yamuna it tends to flood a large area of low lying land, if the stream in the Yamuna is sufficient to block its outlet. The chief tributary of Baghein, the Ranj, joins it at Gurha Kalan (tahsil Naraini) but further east, there are several smaller tributaries from south namely the Madrar, the Barar, the Karehi, the Banganga and the Barua, each of which in turn has tributaries of its own. The barua has been dammed to provide some irrigation through canals. Climate of the district is characterized by hot summer, pleasant monsoon and cold seasons. Although there are mainly three seasons, namely summer (March-June) , rains (July to September) and winter (October-February) , yet the months October and November are essentially transitional months with moderate temperature.

Water samples from different points were collected fortnightly during the early hours of the day, temperature of the water body was recorded with date month and year. Water samples were collected in properly cleaned BOD glass bottles and then sealed tightly to prevent the entry of air during transportation and incubation. From the collected water samples isolation were done by using various method like, diluted method, Agar block technique and baiting technique. During the course of the study baiting technique (Butler,1907), method was extensively used with the help of various baits such as hemp seed, wheat, rice, maize, musturd, radish, funicle, apple fruits, leaf blades, dead ants and flies and human nails,before using the baits proper sterilization were done by keeping them 30 OC temperature inside the oven overnight and then boiled. The baits with myceliar growth were removed and washed in order to the protozoans and bacterial population. They were finally washed with sterilized water. It was found that growth of the fungus on the surface of baits taken out about 24-48 hrs. The growth of the fungus was examined microscopically and brought into culture. The baitng technique gives the maximum number of fungi, hence the method is used throughout the investigation.

Many of the species of fungi of aquatic fungi could be isolated by ordinary method and cultivated on a variety of solid medium, particularly this was true with the member of Pythiaceae, Saprolegniaceae and

Blastocladiaceae. Regarding Chytridiales they were not found to grow on culture medium used in the normal course except a few specially devised for them wherever chytrids was present. Its life history was studied as far as possible on the baits themselves. For getting pure culture of fungi of Pythiaceae, Saprolegniaceae and Blastocladiaceae either single sporangia or single zoospore isolation was done. To cultivate and to preserve the isolated fungi, the synthetic media and preservative were used (Agrawal, G.P. and Hasija, S.K., 1980).

1. YPSS (yeast starch medium)
 - (i) Yeast extract: 4 gms.
 - (ii) Soluble starch : 15 gms
 - (iii) K₂HPO₄: 1gm
 - (iv) MgSo₄ .7H₂O : 0. 5 gm
 - (v) Agar: 30 gms
 - (vi) Distilled water: 1000ml

Streptomycin sulphate and penicilline “a” (0.5 gm each) were added after sterilization.
2. YPG (yeast glucose method)
 - (i) Yeast extract : 4 gms.
 - (ii) Soluble glucose : 20 gms
 - (iii) K₂HPO₄: 1gm
 - (iv) MgSo₄ .7H₂O : 0. 5 gm
 - (v) Agar: 30 gms
 - (vi) Distilled water: 1000ml

Isolated and cultured fungi were put into compound microscope with different combination of eyes pieces. All the possible confirm diagram and detail of morphology, zoosporangia, zoospores, conidia, conidiophores were drawn and measurement has been taken to same scale. Identification of fungus has done with the help of using following relevant monographs, reviews, books and researches reference e.g. Sparrow F.K. (1960), Barnett, H.L. & Hunter (1961), Ellis M.B (1971,1976) Jamaluddin S, Goswami M.G. & Ojha B.M. (2004), Dayal R. & U. Kiran (1988), Khulbe R.D. (2001), Ingold C.T. (1975), Bilgrami K.S, Jamaluddin S & Rizwi M.A (1991), and Sarbhay et al (1996).

III. RESULT AND DISSCUSSION-

During the period of present investigation overall total 31 fungal species (108 colonies), 16 fungal genera belonging to

members of Phlyctidiaceae, Rhizidiaceae, Cladochytriaceae, Chytridiaceae, Megachytriaceae, Blastocladiaceae, Saprolegniaceae, Pythiaceae, and Moniliaceae are isolated from selected site . Out of 31 fungal species, 01 fungal species (01 colonies) belongs to 01 fungal genera of Phlyctidiaceae, 04 fungal species (10 fungal colonies) belongs to 01 fungal genera of Rhizidiaceae, 01 species (02 fungal colonies) belongs to 01 fungal genera of Cladochytriaceae, 01 fungal species (03 fungal colonies) belongs to 01 fungal genera of Chytridiaceae, 01 fungal species (08 fungal colonies) belongs to 01 fungal genera of Megachytriaceae, 04 fungal species (08 fungal colonies) belongs to 03 fungal genera of Blastocladiaceae, 11 fungal species (54 fungal colonies) belongs to 05 fungal genera of Saprolegniaceae, 05 fungal species (12 fungal colonies) belongs to 01 fungal genera of Pythiaceae, and 03 fungal species (03 fungal colonies) belongs to 01 fungal genera of Moniliaceae, (**Table-1**).

The fungal population was not homogenous throughout the year and show seasonal variation . Effect of season on occurrence and distribution of aquatic fungi. are also observed. Meteorological conditions play a very important role. Maximum number of fungal species (48 colonies) belonging to 16 fungal genera are recorded during rainy season followed by 42 colonies in winter season , 11 fungal colonies in autumn season, 07 fungal colonies belonging to different orders are recorded while minimum or all most absent in summer season. Optimum temperature from 20⁰c to 30⁰c is most suitable for the growth of higher fungal species (Khulbe et al, 2001). Highest counts of filamentous fungi were also found by Goncalves et al. (2006) in winter months. Over all comparison of two year of investigation it is clear from the obtained observation that 2009 is more dominant than 2008. In case of total no of colonies (63), total no of species (29) and total no of genera (16) while total no of colonies (45), total no of species (25) and total no of genera (15) during 2008, in case of Seasonal Distribution and Periodicity Among the Aquatic Fungal Flora From Baghain River Distt, Banda (U.P).

TABLE -1

Isolated fungi Season	2008					Total	2009					Total	G.Total
	winter	spring	summer	rainy	autumn		winter	spring	summer	rainy	autumn		
A Phlyctidiaceae													
1 <i>Rhizophydium bandensis</i> <i>sp. nov.</i>	0	0	0	4	0	4	0	0	0	4	0	4	8
Total No. Of Colonies	0	0	0	4	0	4	0	0	0	4	0	4	8
Total No. of Species	0	0	0	1	0	1	0	0	0	1	0	1	1
Total No. of genera	0	0	0	1	0	1	0	0	0	1	0	1	1
B Rhizidiaceae													
1 <i>Rhizophlyctis chitinophila</i>	0	0	0	0	0	0	0	0	0	6	0	6	6
2 <i>Rhizophlyctis herderi</i>	0	0	0	0	0	0	0	0	0	1	0	1	1
3 <i>Rhizophlyctis petersenii</i>	0	0	0	0	0	0	0	0	0	1	0	1	1
4 <i>Rhizophlyctis atarrensensis sp. nov.</i>	0	0	0	0	0	0	0	0	0	2	0	2	2
Total No. Of Colonies	0	0	0	0	0	0	0	0	0	10	0	10	10
Total No. of Species	0	0	0	0	0	0	0	0	0	4	0	4	4
Total No. of genera	0	0	0	0	0	0	0	0	0	1	0	1	1
C Cladochytridiaceae													
1 <i>Cladochytrium tenue</i>	0	0	0	1	0	1	0	0	0	1	0	1	2
Total No. Of Colonies	0	0	0	1	0	1	0	0	0	1	0	1	2
Total No. of Species	0	0	0	1	0	1	0	0	0	1	0	1	1
Total No. of genera	0	0	0	1	0	1	0	0	0	1	0	1	1
D Chytridiaceae													
1 <i>Karlingia gararensis sp. nov.</i>	0	0	0	0	0	0	0	0	0	3	0	3	3
Total No. Of Colonies	0	0	0	0	0	0	0	0	0	3	0	3	3
Total No. of Species	0	0	0	0	0	0	0	0	0	1	0	1	1
Total No. of genera	0	0	0	0	0	0	0	0	0	1	0	1	1
E Megachytridiaceae													
1 <i>Nawakowskiella elegans</i>	3	1	0	0	0	4	3	1	0	0	0	4	8
Total No. Of Colonies	3	1	0	0	0	4	3	1	0	0	0	4	8
Total No. of Species	1	1	0	0	0	1	1	1	0	0	0	1	1
Total No. of genera	1	1	0	0	0	1	1	1	0	0	0	1	1

F	Blastocladiaceae													
1	<i>Allomyces arbuscula</i>	0	0	0	0	0	0	1	0	0	0	0	1	1
2	<i>Blastocladiopsis parva</i>	0	0	0	1	0	1	0	0	0	0	0	0	1
3	<i>Blastocladiella variabilis</i>	0	0	0	2	0	2	0	0	0	2	0	2	4
4	<i>Blastocladiella nawabensis sp. nov.</i>	0	0	0	0	0	0	0	0	0	2	0	2	2
	Total No. Of Colonies	0	0	0	3	0	3	1	0	0	4	0	5	8
	Total No. of Species	0	0	0	2	0	2	1	0	0	2	0	3	4
	Total No. of genera	0	0	0	2	0	2	1	0	0	1	0	3	3
G	Saprolegniaceae													
1	<i>Achlya cornuta</i>	0	0	0	1	0	1	0	0	0	0	0	0	1
2	<i>Achlya klebsiana</i>	0	0	0	4	4	8	0	0	0	4	4	8	16
3	<i>Achlya oligacantha</i>	0	0	0	1	1	2	0	0	0	1	1	2	4
4	<i>Achlya oblongata</i>	0	0	0	0	0	0	1	0	0	0	0	1	1
5	<i>Isoachlya species</i>	0	0	0	0	0	0	4	0	0	0	0	4	4
6	<i>Protoachlya karwensis sp. nov.</i>	0	0	0	0	0	0	1	0	0	0	0	1	1
7	<i>Saprolegnia anisospora</i>	0	0	0	0	1	1	0	0	0	0	0	0	1
8	<i>Saprolegnia diclina</i>	4	0	0	3	0	7	5	0	0	2	0	7	14
9	<i>Saprolegnia ferax</i>	1	0	0	0	0	1	1	0	0	0	0	1	2
10	<i>Saprolegnia uliginosa</i>	1	0	0	0	0	1	1	0	0	0	0	1	2
11	<i>Saprolegnia species</i>	1	2	0	0	0	3	4	1	0	0	0	5	8
	Total No. Of Colonies	7	2	0	9	6	24	17	1	0	7	5	30	54
	Total No. of Species	4	1	0	4	3	12	7	1	0	3	2	13	11
	Total No. of genera	1	1	0	2	1	5	3	1	0	2	1	7	5
H	Phythiaceae													
1	<i>Pythium debaryanum</i>	1	1	0	0	0	2	0	0	0	0	0	0	2
2	<i>Pythium middnetonii</i>	0	0	0	0	0	0	2	0	0	0	0	2	2
3	<i>Pythium mammillatum</i>	1	0	0	0	0	1	1	0	0	0	0	1	2
4	<i>Pythium catenulatum</i>	2	0	0	0	0	2	0	0	0	0	0	0	2
5	<i>Pythium chitinensis sp. nov.</i>	2	0	0	0	0	2	2	0	0	0	0	2	4
	Total No. Of Colonies	6	1	0	0	0	7	5	0	0	0	0	5	12
	Total No. of Species	4	1	0	0	0	4	3	0	0	0	0	3	5
	Total No. of genera	1	1	0	0	0	1	1	0	0	0	0	1	1
I	Moniliaceae													
1	<i>Lamonniera cornuta</i>	0	0	0	0	0	0	0	0	0	1	0	1	1
2	<i>Lamonniera aquatica</i>	0	1	0	0	0	1	0	0	0	0	0	0	1

3	<i>Spirosphaera</i>	0	0	0	1	0	1	0	0	0	0	0	1	
	<i>species</i>													
	Total No. Of Colonies	0	1	0	1	0	2	0	0	0	1	0	1	3
	Total No. of Species	0	1	0	1	0	2	0	0	0	1	0	1	3
	Total No. of genera	0	1	0	1	0	2	0	0	0	1	0	1	2
GRAND TOTAL														
	Total No. Of Colonies	16	5		18	6	45	26	2	0	30	5	63	108
	Total No. of Species	9	4		9	3	25	12	2	0	13	2	29	31
	Total No. of genera	3	4		7	1	15	5	2	0	8	1	17	16

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