

Original Research Article

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An Analysis of Fungal Infection in Some Economically Important Freshwater Fishes of Mayanur Dam, Karur District, Tamil Nadu, India

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ABSTRACT

Keywords

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With increasing human population, freshwater fish culture has been intensified throughout the world as fish is a source of cheap animal protein. However, aquatic fungi have an important bearing on fish health. Hence the present study was aimed at analyzing the commonly occurring fungi in a fresh water system in Tamil Nadu and assessing their infection on fishes. Results reveal that among the three seasons, maximum fungi (16 species) were recorded in the rainy season; while the fish that had the least amount of infection was *Anabas* and the fish that recorded maximum infection was *Catla*. Among the various fungal species, *Achlyaamericana* recorded maximum infection rates in all the three seasons.

Introduction

With exploding human population, India will have to utilize all its avenues for providing a nutrient rich food to its masses. With fish being a good source of nutrient rich protein, fresh water culture has been intensified throughout the world. Even though fish production has increased manifold, today, aquaculturists are being met with diseases limiting their production and profitability. Among the various disease causing agents, fungal agents have been known to cause a number of diseases. Within the aquatic fungi, species of *Oomycetes* have special importance because of their impact on fish health (West,

2006). In addition, many workers (Sati, 1991; Chauhan and Qureshi, 1994; Qureshiet al., 2002) have also reported that fungi belonging to *Saprolegnia*, *Pythium*, *Aphanomyces*, *Dictyuchus* and *Achlya* are some of the most virulent parasites. Hence the present study was aimed at identifying the commonly occurring aquatic fungi in a fresh water system as well as its impact of fish infection grown in this system.

Materials and Methods

Five economically important freshwater fishes viz., *Catla catla*, *Notopterus chitala*, *Channa striatus*, *Labeo rohita* and *Channa marulius*

were collected in Mayanur region, Cauvery River, Karur District, Tamil Nadu during January to December 2016. The fishes were collected with the help of fisherman in sterile polythene bags in aerated water and transported immediately to the laboratory, for mycological study. The fishes were kept in separate in glass aquaria with continuous air supply at ambient temperature. Isolation of fungi from infected fishes were carried out by taking small pieces from muscles (about 2mm in diameter) from different portions of body and washed thoroughly with distilled water. These tissues were then inoculated over plates containing different culture media viz., Potato Dextrose Agar medium (Peeled potato-250gm, Dextrose-20gm, Agar-15gm, Distilled 1000ml), Richard's medium (Potassium nitrate 10gm, Potassium dihydrogen phosphate 5gm, Magnesium sulphate 2.50gm, Ferric chloride 0.02gm, Sucrose 50gm, Distilled water 1000ml) and Czapek-Dox Agar medium (Agar 15.0gm Sodium nitrate 2.0gm, Potassium dihydrogen phosphate 1.0gm, Magnesium sulphate 0.5gm, Ferric sulphate 0.01gm, Sucrose 30.0gm, distilled water 1000ml). Streptomycin (50mg/l) was added in the medium to avoid bacterial contamination. Among the three media, the Potato Dextrose Agar medium was found to be the best medium for invariably all the isolated fungi. An average three to seven days of incubation at a temperature ranging between 26 and 32°C in the incubator was provided to the different isolated fungi.

Identification and characterization were made by observing the colony colour and texture and the prepared slides by comparing with authentic manuals (Raper and Thom, 1949; Barnett and Hunter, 1972; Cooney and Emerson 1964; Samson and Tansey 1977; Domsch *et al.*, 1980, Bilgrami *et al.*,; 1991, Jamaluddin, 2004). Unidentified species, devoid of fruiting bodies were designated as sterile mycelia. The seasonal variation and

percentage of infection of fishes were analyzed. The percentage of frequency of fungal species occurrence was calculated as follows:

Percentage of Frequency of Species =

$$\frac{\text{Average number of total colonies of species in one plate}}{\text{Average number of total colonies of all the species in one plate}} \times 100$$

Results and Discussion

The fungi that were isolated in the aquatic system is presented in Table 1. As evident from the table, a total of 16 species belonging to 10 genera could be identified. Of these, four species belonged to the genera *Achlya*, two species each to *Aspergillus*, *Pythium* and *Saprolegnia* and one each to the genus *Allomyces*, *Aphanomyces*, *Hiraustotheca*, *Chaetomium*, *Dychuchus* and *Alkharia*.

Among the four species of *Achlya*, *A. Americana* dominated even though all the *Achlya* species were perennial. Within the two *Pythium* species, *P. aphanidesmatum* occurred only during the rainy season while among the two species of *Saprolegnia* both were absent during the summer season. Within the *Aspergillus* species, *A. fumigatus* dominated over *A. niger* even though both were perennial. The other perennial species were *Allomyces anomatus* and *Aphanomyces laevis* and both dominated during the rainy season. Species like *Hiraust itheca*, *Chaetomium*, *Dychuchus* and *Alknaria* were recorded only during the rainy season.

On the whole, 11 species were recorded during the pre-summer season, eight species in the summer season and all the 16 species in the rainy season. Thus, it is clearly evident that all the fungal species in the present study preferred the rainy season. A perusal of

literature reveals that Rashmi Kumari and Chandan Kumar (2015) while studying fungal infection in fishes in a fresh water system in Bihar also reported maximum occurrence of fungi in October and minimum in June. This correlates with the present study as maximum fungal diversity was recorded in rainy season

(August-November) and minimum in summer (April-July). The maximum diversity present during the rainy season could be attributed to optimum temperature as well as enhanced nutrient levels present during this time due to increased run-off entering the system.

Table.1 Pathogenic fungi isolated from the fresh water aquatic system of Mayanur Dam

S. No.	Species of Fishes	Pre-summer season (Dec-Mar)	Summer season (Apr-Jul)	Rainy season (Aug-Nov)
1.	<i>Achlya americana</i>	15.3 - 17.2	9.8 - 12.4	18.4 - 22.9
2.	<i>A. apiculata</i>	9.4 - 10.2	5.4 - 8.3	15.3 - 17.8
3.	<i>A conspicua</i>	6.4 - 7.8	3.4 - 6.4	9.0 - 10.9
4.	<i>A. prolifera</i>	8.4 - 9.9	4.6 - 5.1	10.2 - 12.6
5.	<i>Allomyces anomalus</i>	2.0 - 4.3	0 - 2.1	6.2 - 8.4
6.	<i>Aphanomyces laevis</i>	2.6 - 4.0	0 - 1.3	6.4 - 8.1
7.	<i>Aspergillus fumigatus</i>	3.1 - 5.2	1.6 - 2.6	11.1 - 14.2
8.	<i>A. niger</i>	5.8 - 8.4	2.3 - 4.6	10.4 - 13.8
9.	<i>Pythium aphanidesematum</i>	-	-	3.2 - 6.4
10.	<i>P. undulatus</i>	3.2 - 6.3	-	8.1 - 9.6
11.	<i>Saprolegnia hypogyna</i>	3.7 - 5.3	-	7.2 - 10.7
12.	<i>S. parasitica</i>	1.6 - 3.8	-	4.2 - 5.6
13.	<i>Hiraustitheca</i> sp.	-	-	3.7 - 4.7
14.	<i>Chaetomium globosum</i>	-	-	2.4 - 3.5
15.	<i>Dychuchus</i> sp.	-	-	1.2 - 3.4
16.	<i>Alknaria tenuis</i>	-	-	3.2 - 4.1

Table.2 Fungal infection in the various fishes collected from the field of Mayanur Dam

S. No.	Fungal Species	Percentage
1.	<i>Catla catla</i>	20.9
2.	<i>Labeo rohita</i>	10.1
3.	<i>Chirhinus murigala</i>	13.6
4.	<i>Clariasba trachus</i>	19.4
5.	<i>Mystus vittatus</i>	9.7
6.	<i>Anabas testudineus</i>	8.2
7.	<i>Oreochromis mossabicus</i>	18.1

Table.3 Percentage of infection of the various species during the three seasons of Mayanur Dam

S. No.	Species of Fishes	Pre-summer season (Dec-Mar)	Summer season (Apr-Jul)	Rainy season (Aug-Nov)
1.	<i>Achlya americana</i>	20.4	26.1	15.2
2.	<i>A. apiculata</i>	16.2	18.4	10.1
3.	<i>A conspicua</i>	4.3	14.3	5.6
4.	<i>A. prolifera</i>	14.2	16.1	7.1
5.	<i>Allomyces anomalus</i>	3.1	4.6	5.4
6.	<i>Aphanomyces laevis</i>	4.1	5.7	5.1
7.	<i>Aspergillus fumigatus</i>	6.4	2.2	8.7
8.	<i>A. niger</i>	9.8	12.6	7.3
9.	<i>Pythium aphanidesematum</i>	-	-	5.2
10.	<i>P. undulatus</i>	11.1	-	6.4
11.	<i>Saprolegnia hypogyna</i>	6.2	-	5.2
12.	<i>S. parasitica</i>	3.4	-	4.2
13.	<i>Hiraustithecra sp.</i>	-	-	4.8
14.	<i>Chaetomium globosum</i>	-	-	3.3
15.	<i>Dychuchus sp.</i>	-	-	2.2
16.	<i>Alknaria tenuis</i>	-	-	4.2

The fungal infection in the various fishes grown in the system is presented in Table 2. As evident from the table, the fungal infection was found to vary from 8.2 to 20.9%; while the maximum infection was found in *Catla catla*, the lowest infection occurred in *Anabas testudineus*.

The percentage of infection of the various fungal species during the three seasons is presented in Table 3.

As seen from the table, during the pre-summer season, maximum infection was shown by *A. americana* (20.4%) and the least by *Saprolegnia parasitica* (3.4%). During the summer season, again the maximum percentage of infection was shown by *A. americana* (26.1%) while the least was shown by *Aspergillus fumigatus* (2.2%). In the rainy season also, the maximum percentage of infection was recorded by *A. americana* (15.2%) while the minimum infection was by

Tychuchus (2.2). Thus, it is clear that the maximum infection was shown by *A. americana* for all seasons. Similar observations were also recorded by various workers in different aquatic system in India (Khulbe and Sati, 1981; Sati, 1991; Chauhan and Qureshi, 1994; Qureshi *et al.*, 2002; Jamaluddin *et al.*, 2004; Hussain *et al.*, 2011; Rashmi Kumari and Chandan Kumar, 2015).

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