



## Incidences of Mycotic infections in *Channa punctatus* of Wadali Lake, Amravati, MS, India

Pachade G. R., Bhatkar N.V. and Hande D.V.\*

Dept of Zoology, Shri Shivaji College, Akot, Dist Akola MS, 444101, INDIA

\*Dept of Botany, Shri Shivaji Science College, Amravati, MS.444601, INDIA

Available online at: [www.isca.in](http://www.isca.in), [www.isca.me](http://www.isca.me)

Received 31<sup>st</sup> July 2014, revised 5<sup>th</sup> September 2014, accepted 9<sup>th</sup> October 2014

### Abstract

Healthy and infected fish *Channa punctatus* were collected from Wadali Lake Amravati for the present study during July 2011 to July 2013. The infected fishes in catch were identified from red spot on their body, damaged and their sluggishness. In the present investigation mycological studies were carried out on fishes with fungal infection. Isolates Fungi were obtained from infected fishes exhibited eleven different fungal infections. The fungal infected tissue was cultured on appropriate culture media and the microscopic observations showed the presence of fungal species like *Alternaria alternata*, *Aphanomyces invadans*, *Aspergillus flavus*, *Aspergillus niger*, *Cladosporium cladosporides*, *Curvularia lunata*, *Drechslera hawaiiensis*, *Fusarium oxysporum*, *Mucor mucedo*, *Rhizopus stolonifer* and *Saprolegnia parasitica*. All these Fungi were isolated from *Channa punctatus*.

**Keywords:** Fungal infection, *Channa punctatus*, wadali lake.

### Introduction

Fishes are one of the most important groups of vertebrates which provide free economic services to human beings in several ways. In the world fish production, India ranks third<sup>1</sup>. Fungal infections of fish harmed fisheries and aquaculture. Fungal infection in fishes causes damages on various parts of the body<sup>2</sup>. In India, the incidence of disease has been observed in major carps cultured in the country<sup>3,4</sup>. The impact of these infections on sizes in fresh water ecosystems. In India fishermen is facing serious problems with fungal diseases. Therefore, diseases cause high mortality, which results in economic losses. Sufficient information is not available to overcome the problem<sup>5-10</sup>. Study of fungal infections in fresh water fish is of great significance as it would be helpful in knowing the diversity and life cycle of fungus parasitic and saprophytic on the fresh water fish. Therefore, the study was undertaken on fungal infections in locally available fresh water edible fishes.

### Material and methods

Wadali Lake was selected for the study of fungal infections on the freshwater fishes. Wadali Lake is located in Amravati, Maharashtra (India). Healthy and infected fishes (*Channa punctatus*) were collected from Wadali Lake Amravati (20°55'24.37"N and 77°47'46.12"E) for the present study.

**Collection of fishes and Sampling techniques:** The healthy and infected *Channa punctatus* were collected randomly every week at regular interval from the study area with the help of fishermen. The infected fishes were identified from red spot on their body, excess mucus secretions, damaged and infected gills and their sluggishness. Infected fishes were studied during 2011

to 2013. For further investigations like isolation and their morphotaxonomy fishes were brought to laboratory and kept in big aquaria (48x18x18) inches.

**Isolation of fungus:** Small block of muscle was removed from the lesion and culture media for the isolation of the fungus. Potato Dextrose Agar (PDA); Corn Meal Agar (CMA); Water Agar (WA) and Czapek Dox Agar (CDA) were used as a media into the Petri dishes. The tissue blocks were transferred into the other set of Petri dishes. Petri dishes were placed inverted in incubator at 25°C for 3 days, until a circular fungal mat developed, which were used for subculture of the fungus.

**Incidence of fungal diseases:** Fungi from infected fishes were identified with help of characters and measurements of fruiting bodies, color, shape, size and attachments of conidia with relevant literature<sup>11</sup>. Incidence of fungal disease of infected fishes was calculated by following formula:

$$\text{Incidence (\%)} = (\text{No. of fish infected} / \text{No. of fish Examined}) \times 100.$$

### Results and Discussion

During the study period total 1920 fishes were examined; out of which 230 fishes were found to be infected by Fungi and thus the incidence of infection observed was 11.97% of the total fishes observed (table-1). During study period out of 629 *Channa punctatus* 123 fishes were infected (19.55%). Clinical signs of fungal infection were more severe in the month of October, November, December and January, where as in the month of March and April most of the fishes were not infected and were healthy.

**Table 1**  
**Fungi infected fish species and their incidence during the study period**

S. N	Name of fish	Total No. of Fishes Observed	Total No. of fishes Infected	Incidence (%)
1	<i>Channa punctatus</i>	629	123	19.55
2	<i>Clarias</i> sp.	593	97	16.35
3	<i>Labeo rohita</i>	272	00	00
4	<i>Catla catla</i>	237	00	00
5	<i>Heteropneustes fossilis</i>	189	10	5.29
	Total	1920	230	11.97

**Fungal infections:** The incidences of fungal infections in *C. punctatus* as reported during present investigations are shown in table-2.

**Alternaria alternata:** (Fr.) Keissler, From the study of fungal incidence it was observed that *A.alternata* prevails throughout the year except the month of May and June in case of *C. punctatus* with the maximum incidence 20% during November. It was more or less equally reported during the month of August, September, October, December and January in infected *C. punctatus*.

**Aphanomyces invadans:** Willoughby, Roberts and Chinabut, While investigating the mycotic dermal infections the average

incidence of *A. invadans* was found to be increasing from month of August (05%) up to the month of December (10%) and no infection was reported after the month of February in *C. punctatus*.

**Aspergillus flavus:** Link ex Gray, Infection of *Aspergillus* in the fishes was very common during present study. Infection of *A. flavus* categorically was more during November to December in *Channa punctatus*. However, those Fungi were reported even upto February. It was not reported in *C. punctatus* during April to June.

**Aspergillus niger:** Van Tieghem, Maximum average incidence i.e. 28% of *A. niger* was reported during the January in *C. punctatus*. It is noticed that no incidence of *A. niger* was observed during the month of April to June.

**Cladosporium cladosporides:** Link ex Gray, *C. cladosporides* infection was reported from *C. punctatus* throughout the year except in May and June. *C. cladosporides* infection was more in October and November in *C. punctatus*. However, *C. cladosporides* infection was not recorded during March to June.

**Curvularia lunata:** Boedijn, The incidence of *C. lunata* infection appears from the month of July in *C. punctatus* last up to month of March and February. Maximum average incidence of *C. lunata* was observed in October and January in *C. punctatus*. No infection of *C. lunata* was observed during April to June in *C. punctatus* during March to June.

**Table 2**  
**Average incidence of infection by fungal species (%) on Channa punctatus during study period**

Sr. No	Fungi Isolated	Fungal species % per Month											
		July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June
1	<i>Alternaria alternata</i>	05	14.5	14.5	17.5	20	16	16	9.5	04	01	00	00
2	<i>Aphanomyces invadans</i>	00	05	06	07	09	10	9.5	00	00	00	00	00
3	<i>Aspergillus flavus</i>	05	10.5	18.5	18.5	24	26.5	22	20	05	00	00	00
4	<i>Aspergillus niger</i>	7.5	15	20.5	22	25	25	28	20	10	00	00	00
5	<i>Cladosporium cladosporides</i>	9.5	13.5	17	19	14.5	15	14	12	10	04	00	00
6	<i>Curvularia lunata</i>	3.5	9.5	13.5	16.5	13.5	14	14	8.5	5.5	00	00	00
7	<i>Drechslera hawaiiensis</i>	09	13	15	17.5	19.5	18	16	12	8.5	00	00	00
8	<i>Fusarium oxysporium</i>	04	15	11.5	18	20	14	15	10	00	00	00	00
9	<i>Mucor mucedo</i>	10	9.5	9.5	11	11	10	6.5	02	00	00	00	00
10	<i>Rhizopus stolonifer</i>	8.5	11.5	10.5	14	12.5	16	15	9.5	05	00	00	00
11	<i>Saprolegnia parasitica</i>	00	10	20	11.5	20	20	20	10	00	00	00	00

**Drechslera hawaiiensis:** Ellis, From the study of fungal incidence of *D. hawaiiensis*, it was observed that this fungus prevails throughout the year except April to June in *C. punctatus*. The maximum incidence 19.5 % was noted during the month of November.

**Fusarium oxysporum:** Schlechtendahl, The incidence of *Fusarium oxysporum* infection was at the peak (20%) during November in *C. punctatus*. In *Channa punctatus* *F. oxysporum* infection starts to appear from the month of July and it prevails only up to February, while no incidence of infection was observed during March.

**Mucor mucedo:** Micheli ex Saint-Amans, The infection of *M. mucedo* in *C. punctatus* was reported from July upto February. Maximum average incidence (11%) of *M. mucedo* was observed in the month of November in *C. punctatus*. However, the infection was increasing from September onwards upto January. No incidence of infections of *M. mucedo* was observed during March to June in the fishes.

**Rhizopus stolonifer:** Ehrenberg ex Corda, The infection of *R. stolonifer* was reported from July to March in *C. punctatus*. The maximum average incidence (16 %) was observed in the month of December in *C. punctatus*. The maximum incidence of infection was 18 % during the month of December. Whereas in *C. punctatus* no incidence of fungus was observed April to June.

**Saprolegnia parasitica:** Coker, During the present investigations *Channa punctatus* were found to be infected with *Saprolegnia parasitica* during August to February. The maximum incidence of *Saprolegnia parasitica* was noted in the months of September and November to January and minimum incidence in the months August, October and February. The infection was not reported from March to July.

**Discussion:** Fishes are totally dependent upon quality of water with respect to breathing, feeding, growth, excretion, maintenance of salt balance, and also for reproduction. Water quality is the first and most important limiting factor in existence of fish in any aquatic ecosystem. However pathogens of fish already stressed by disease, due to mechanical damage. The fungus can spread rapidly among fish population and the fungal spores dispersed with water currents<sup>12</sup>.

For the first time Arderon reported fungal infection in fish during the mid eighteenth century<sup>13</sup>. Later on, some other workers reported several pathogenic Fungi from different species of fish and fish eggs<sup>14,19</sup>.

In India, the mycological studies were initiated and observed red spots on the body of *Osphronemus gouramy* caused by *Saprolegnia* species<sup>20</sup>. In the present investigation *S. parasitica* and *A. niger* were found to be the most common water molds responsible for the fungal infections to fresh water fishes. *Saprolegnia* is found to be more virulent for fishes. The

infection of *Saprolegnia* is termed as saprolegniasis<sup>21,22</sup>. Saprolegniosis constitute one of the most severe diseases causing problems in fish culture<sup>23,24</sup>.

The earlier studies reported that the *Saprolegnia parasitica* was most destructive<sup>25</sup>. This finding confirms with the reports that the infection caused by *Saprolegnia parasitica* in Salmon resulted mass mortality.

*Saprolegnia* is frequently found in freshwater ecosystems and is the main genus of Oomycetes responsible for fungal infections. Almost every freshwater fish is exposed to fungal infection at least one species during its lifetime. It may be due to ability of the fungus to tolerate wide range of temperature variations<sup>27,30</sup>.

## Conclusion

The incidences of fungal infections varied with fungal species and the season of the year. On comparing the fungal incidences, the highest prevalence of infection was in winter from November to January and the lowest during February to July. Retardation of the pathogenic potentiality of the water molds at higher temperature (more than 28°C), which cannot infect and require a certain period for multiplication. In the present investigation *S. parasitica* and *A. niger* were found to be the most common water molds responsible for the fungal infections to fresh water fishes. *Saprolegnia* is found to be more virulent for fishes.

## References

1. World Bank, India marine fisheries, issue opportunities and transition for sustainable developments Agriculture and rural development sector unit South Asia region, Report No. 54259, 109 (2010)
2. Refai M.K., Laila A. Mohamed, Amany M. Kenawy and Shima El-S M.A., The assessment of mycotic settlement of freshwater fishes in Egypt, *Journal of American scienc*, 6(11), 595-602 (2010)
3. Gopalakrishnan V., Controlling pests and diseases of cultured fishes, *Indian Livstk*, 1(1), 51-54 (1963)
4. Gopalakrishnan V., Recent developments in the prevention and control of Parasites of fishes cultured in Indian water, *Proc. of Zoo. Soc. India*, 17(1), 85- 100 (1964)
5. Rahman M.M. and Chowdhury M.B.R., Isolation of bacterial pathogen causing an ulcer disease in farmed carp fishes of Mymensingh Bangladesh, *Bangladesh Journal of fisheries*, 19, 103-110 (1996)
6. Chowdhury M.B.R., Involvement of Aeroimionads and Pseudomonads diseases of farmed fish in Bangladesh, Proceedings of the International Symposium on Diseases in Marine Aquaculture, Hiroshima, 3-6 October 1997, Gyoby-Kenkyu, *Fish Pathology*, 33(4), 247-254 (1998)

7. Rahman M.M., Chowdhury M.B.R., Uddin M.N. and Pal H.K., Prevalence of Ulcer disease in some wild fishes in Mymensingh, Bangladesh, *Bangladesh Journal of Microbiology*, **15**, 9-16 (1998)
8. Sarker M.A., Chowdhury M.B.R., Rahman M.M. and Kashem M.A., Pathogenicity and antibiotic resistance of some *Aeromonas hydrophila* isolates, *Bangladesh Journal of fisheries*, **21**, 61-64 (1998)
9. Majumder B., Sarker M.G.A., Khan M.H. and Chowdhury M.B.R., Incidence of Ulcer type of disease in wild fishes of Bangladesh, *Bangladesh Journal of fisheries research*, **5**, 163-168 (2001)
10. Laharia R., Environmental perturbations of Epizootic Ulcerative Syndrome (EUS) in fresh water fishes : Cause, immune responses and consequences, Ph.D. Thesis, Sant Gadge Baba Amravati University, Amravati, (2006)
11. Barnett H.L. and Hunter B.B., Illustrated Genera of Imperfect Fungi. 4<sup>th</sup> ed. Macmillan Publishing Company, **106**, (1972)
12. Hatai K., and Wada S., Visceral mycosis in dwarf gourami (*Colisa lalia*) due to *Aphanomyces* sp. In : Chou L.M., Munro A.D., Lam T.J., Chen T.W., Cheong L.K.K., Ding J.K., Hooi K.K., Khoo H. W., Phang V.P.E., Shim K.F. and Tan C.H. (Eds), Proceedings of the Third Asian Fisheries Forum, *Asian Fisheries Society, Manila, Philippines*, 298-301 (1994)
13. Arderon W., The substance of a letter from Mr. William Arderon, F.R.S., *Phil. Trans. R.soc.*, **45 (487)**, 321-323 (1748)
14. Fraser G.C., Callinan R.B. and Calder L.M., *Aphanomyces* Species associated with red spot disease, An Ulcerative disease of Estuarine fish from Eastern Australia, *Journal of Fish disease* **15**, 173-181 (1992)
15. Roberts R.J., Willoughby L.G. and Chinabut S., Mycotic aspects of Epizootic Ulcerative Syndrome (EUS) of Asian fishes, *J fish Dis*, **16**, 169-183 (1993)
16. Chinnabut S., Roberts R.J., Willoughby G.R. and Pearson M.D., Histopathology of snake head, *Channa striatus* (Bloch), experimentally infected with the specific *Aphanomyces* fungus associated with Epizootic Ulcerative syndrome (EUS) at different temperatures, *Journal of Fish Diseases* **18**, 41-47 (1995)
17. Khulbe R.D., Joshi C. and Bisht G.S., Fungal diseases of fish in Nanak Sagar, Nainital, India. *Mycopathology*, **130**, 71-74 (1995)
18. Willoughby L.G., Roberts R.J. and Chinnabut S., *Aphanomyces invaderis* sp. Nov., the fungal pathogen of freshwater tropical fish affected by Epizootic Ulcerative Syndrome, *J. Fish Dis.*, **18**, 273-275 (1995)
19. Mastan S.A., Incidences of dermatomycosis in fishes of Larpur reserviour, *Journal of Herbal Medicine and Toxicology*, **2(1)**, 37-40 (2008)
20. Chidambaram K., Fungus disease of gourami (*Osphromenus goramy*, lacepede) in a pond at Madras, *Curr. Sci.*, **11**, 289-290 (1942)
21. Roberts R.J., The mycology of teleosts, in Roberts, R.J. (ed). *Fish Pathology*, 2<sup>nd</sup> edition. London, England, Baillere Tindall, 320-336, (1989)
22. Beakes G.W., Wood S.E. and Burr A.W., Features which characterize *Saprolegnia* isolates from Salmonid fish lesions : A review. In *Salmon Saprolegniasis*. Edited by G. J. Mueller. U.S., Department of Energy, Bonneville Power Administration, Portland, *Oregon.*, **33-66** (1994)
23. Shaheen A.A., Mycoflora of some freshwater fish. M.V.Sc. Thesis, *Fac. Vet. Med. Zagazic Univ*, (1986)
24. El-Zayat S.A.M., Studies on freshwater Fungi of Aswan high Dame Lake, Ph.D. Thesis, Botany Dept. Faculty of Science (Aswan), Assiut University, Egypt, (1988)
25. Scott W.W. and O'bier A.H., Aquatic fungi associated with diseased fish and fish eggs, *Prog. Fish*, **24**, 3-15 (1962)
26. Hatai K. and Hoshiai G., Saprolegniasis in cultured coho Salmon, *Fish Pathol*, **11**, 233-234 (1992)
27. Neish G.A., Observations on saprolegniasis of adult sockeye salmon, *Oncorhynchus nerka* (Walbaum), *J. Fish Biol.*, **10**, 513-522 (1977)
28. Pickering A.D., Factors which predispose salmonid fish to Saprolegniasis, Edited by G. J. Mueller, U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon., 67-84 (1994)
29. Noga E.J., *Fish Disease Diagnosis and Treatment*, Mosby-Year Book, Inc. St. Louis, MO., 367 (1996)
30. Bruno D.W. and Wood B.P., *Saprolegnia* and other *Oomycetes*. In *Fish Diseases and Disorder*, Volume 3, Viral, Bacterial and Fungal Infections, Edited by P.T.K. Wood and D.W. Bruno, CABI publishing, Wallingford, Oxon, United Kingdom, **599-659** (1999)