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An Analysis of the Commonly Occurring Fungal Populations in Water, Sediment and the Fish (*Glossogobius giuris*) at Lower Anicut, Thanjavur District, Tamil Nadu, India

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A B S T R A C T

One of the present situations faced by the aquaculture industry is the presence of infections leading to huge losses. Among the fish pathogens, fungal infections come next only to bacterial infections. Hence the present study was attempted to identify the common fungal flora in the sediments, water and fish (*Glossogobius giuris*) from Lower Anicut, Tamil Nadu. Results indicate that a total of 18 species belonging to eight genera could be identified. The sediment and water recorded 11 species while the skin of *Glossogobius giuris* recorded seven species and the foregut and midgut six species each and the hindgut, five species of fungi. The presence of fungi in *Glossogobius giuris* highlights the need for giving immediate attention as fungal infections can be disastrous.

Introduction

Today aquaculture contributes a great deal to the national productivity, socio-economic development and renewable aquatic living resources (Ramaiah, 2006). However, diseases can cause huge economic losses in aquaculture and fungal infections are second only to bacterial diseases in economic importance (Meyer, 1991). According to Bangyeekhun and Sylvie (2001) fungi can attack fish in all its life stages in both wild as well as commercial fish farms. Chukanhom and Hatai (2004) reported that the mortality rate of incubated eggs due to fungal infections can reach 100%. Hence, it is imperative to address this issue immediately. In India, records on mycotic infections are limited and in many instances missing (Ramaiah, 2006).

India, today ranks second in aquaculture production and any fungal attack on farm fishes can cause devastation to the Indian farmers besides leading to a decrease in aquaculture production. Hence, a study was attempted to identify the fungi present in water, sediment as well as in *Glossogobius giuris* collected from Lower Anicut, Anakkarai village, Thiruppanandal Block in Thanjavur District, Tamil Nadu, India.

Materials and Methods

Site of collection

For the present investigation, the samples were collected from the River Cauvery, Lower Anicut, Thanjavur District, Tamil Nadu. This riverhas a rich source of fish diversity with a variety of fishes like murrels, cat fish, carps and eels.

Collection of Sample

Samples of soil, water and the Indian freshwater sand gobi (*Glossogobius giuris*) were collected from January to February 2018 from Lower Anicut. The water and soil samples were taken in plastic containers kept in an ice box and brought to the laboratory.

Glossogobius giuris were collected in containers and brought to the laboratory in live condition. The weight and length of the fishes were recorded to determine the length-weight relationship. The fish were dissected and the tissues of skin, foregut, mid gut and hindguts were taken separately.

Identification and colony counting of fungi

Fungi grow comparatively at slow rates, requiring several days to weeks; fungi produce spores on brightly coloured aerial hyphae. Most fungi grow best at room temperature (25 °C) rather than 35 °C. The basic medium for the culture of many fungi is potato dextrose agar (PDA).

After sterilization, the medium was poured into sterilized petridishes quickly under aseptic conditions. The petriplates were marked as control, soil, water, skin, foregut, midgut and hindgut. Before the medium was poured to the petriplates, a pinch of streptomycin was added to the medium to avoid bacterial growth. Preparation of Different Dilution of the sample was done by the Serial Dilution Method.

Inoculation

The seven petriplates with the solidified agar were marked as control 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6} dilutions. Inoculation was done with the help of micropipette inside the inoculation chamber. The diluted sample was taken with the help of microculture medium into the culture plates. Each plate was rotated slowly to avoid splashing and mixing the organisms uniformly. The same process was repeated to inoculate the remaining six plates. After the inoculation, all the inoculated petriplates and control petriplates were placed in the culture chamber for 6-7 days at room temperature (25°) for the its growth.

In addition, seven petriplates with solidified PDA medium were also taken and marked as control, soil, water, epidermis, foregut, midgut and hindgut. Inoculation was done with help of micro pipette. Diluted samples from 10^{-4} dilution were taken and transferred to the petriplate containing the medium.

These were placed in the culture medium chamber for 6-7 days at room temperature (25 °C) for its growth. Similar procedure was adopted for the other samples.

Colony counting

The well-developed fungal colonies were counted directly with the help of counting chamber andthe average number of the fungal colonies were recorded in each sample.

Isolation of fungi

Using a dissecting needle, a tuft of the fungi was taken from the culture to the slide and staining was done for identification purpose.

Table.1 Existence of fungal flora in various samples of sand *Gobi* (*Glossogobius giuris*) and in water and soil

S. No.	Name of the Fungi	Name of the Samples					
		Soil	Water	Epidermis	Foregut	Midgut	Hindgut
1.	*Pencilliumcitrinum*	+	–	+	–	–	+
2.	*Pencilliumjanthinellum*	+	–	–	+	+	+
3.	*Pencilliumlanosum*	–	+	+	–	–	–
4.	*Aspergillus apicalis*	+	+	–	+	+	–
5.	*Aspergillus flavus*	–	-	+	–	–	+
6.	*Aspergillus* sutagimuf	–	+	–	+	–	–
7.	*Aspergillus luchensis*	+	–	+	–	+	–
8.	*Aspergillus terrus*	+	+	–	–	–	–
9.	*Aspergillus sydowi*	+	+	–	+	-	–
10.	*Aspergillus ustus*	–	+	+	-	+	–
11.	*Aspergillus nidulans*	+	–	–	–	–	–
12.	*Aspergillus niger*	+	+	+	–	+	+
13.	*Fusarium oxysporum*	+	–	–	+	–	–
14.	*Alternaria alternata*	+	–	–	-	–	-
15.	*Pullavia*sp.	+	+	–	–	–	-
16.	*Syncephalastrium*sp.	–	+	+	–	–	–
17.	*Rhizopus nigricans*	–	+	–	+	+	+
18.	*Dreschlera*sp.	–	+	–	-	–	–

+ denotes present; –denotes absent.

Staining of fungi

Fungi were stained with lactophenol cotton blue stain. After staining, the structure of the fungus was photographed under a Nikon microscope.The isolated fungi were identified with the help of available literature (Raper and Thom, 1949; Gilman, 1957; Barnett, 1962; Barron, 1986; Barnett and Hunter, 1986; Ellis, 1971, 1976; Subramanian, 1971; Ainsworth *et al.,* 1973; Booth, 1977; Domsch *et al.,* 1980; Van der Plaats-Niterink, 1981; Von Arx, 1981; Stolk and Samson, 1983; Schipper, 1984).

Results and Discussion

The various fungal species identified in water, sediment and fish (*Glossogobius giuris*) are presented in the Table-1. A total of 18 fungal species belonging to eight genera could be identified. Among this, the genus *Aspergillus* was represented by nine species and the genus *Penicillium* by three species. The remaining genera were represented by a single species.

A perusal of the fungal species in sediment and water reveals that both the sediment and water recorded 11 species each. However, the sediment recorded six species which were unique (*P. citrinum, P. janthinellum, A. luchensis, A. nidulans, F. oxysporum* and *A. alternata*) while the water samples recorded six unique species(*P. lanosum, A. sutagimuf, A. ustus, S. sporangiophores, R. nigricans* and *D. spicifera*) which were not recorded in sediment. Nevertheless, both the water and sediments recorded four species which was common (*A. terrus, A. sydowi, A. niger*and *A. fumigatus*).

The skin of eel recorded the presence of seven fungi. The foregut recorded the presence of six species of fungi. Out of these, three species were unique and not recorded in the midgut and huntgut (*A. fumigatus, A. sydowi* and *F. oxysporum*). The midgut also recorded the presence of six species of which two were unique (*A. luchensis* and *A. ustus*) while the hindgut recorded the presence of five species of which only two were unique (*P. citrinum* and *A. flavus*).

Comparing the gut flora reveals that two species were common to all parts of the gut (*P. janthinellum* and *R. nigricans*). In addition, the foregut and midgut recorded one species (*A. flavus*) which was not recorded in the hindgut while the midgut and kindgut also recorded a species (*A. niger*) which was not recorded in the foregut. Interestingly, two species (*P. lanosum* and *D. spicifera*) were not recorded in any part of the gut at all.

Eze and Ogbaran (2010) suggested that among the fungi, *Aspergillus* and *Penicillium* are biologically the most successful and are expected to occur in all sorts of habitats.

According to Rosas *et al*., (1992) *Penicillium* is one of the most common dominant species in tropical regions while *Aspergillus* is the most dominant throughout the world. This appears to be true in the present study also as*Aspergillus* was the most dominant species followed by *Penicillium.*

As to the presence of fungi in fishes, literature reveals that many workers have identified several pathogenic fungi from different species of fish as well as fish eggs (Sati, 2002; Fraser *et al.,* 1992; Roberts *et al.,* 1993; Chinnabut *et al.,* 1995; Mastan, 2008). Recently, Mastan (2016) while studying the fungal infection of fresh water fishes in Andhra Pradesh reported the presence of 17 species of fungi in 12 different types of fishes.

The presence of fungi highlights the need for immediate attention as fungal infections can be disastrous leading to collapse of the aquaculture industry.

References

Ainsworth, G. C., Sparrow, F. K. and Sussman, A. S. (1973). A Taxonomic Review with Keys: Basidiomycetes and lower fungi. In: Ainsworth, G. C., Sparrow, F. K. and Sussman, A. S. (eds). The fungi, an advanced treatise, Vol. 4B Academic Press, Orlando.

Bangyeekhun, E. and Sylvie, M. A. (2001). Characterization of *Saprolegnia* sp. isolates from channel catfish. *Dis.Aquat. Organ.*, 45: 53-59.

Barnett, H. L. (1962). *Illustrated Genera of Imperfect Fungi*. Burgess Publishing Co., p. 58.

Barnett, H. L. and Hunter, B. B. (1986). *Illustrated genera of imperfect fungi*. 4th edn., Macmillan Publishing Company, p. 142.

Barron, G. L. (1986). *The genera of Hyphomycetes from Soil*. Williams and Wilkins, Baltimore. pp. 160.

Booth, C. (1977). *Fusarium*. Commonwealth Mycological Institute. Kew, Surrey, England.

Chinnabut, S., Roberts, R. J., Willoughby, L. G. and Pearson, M. D. (1995). Histopathology of snake head, *Channastriatus* (Bloch) experimentally infected with the specific *Aphanomyces* fungus associated with Epizootic Ulcerative Syndrome (EUS) at different temperatures. *J. Fish Dis*., 18: 41-47.

Chukanhom, K. and Hatai, K. (2004). Freshwater Oomycete isolated from eggs of the common carp (*Cyprinus carpio*) in Thailand. *Mycoscience*. 45: 42-48.

Domsch, K. H., Gams, W. and Anderson, T. H. (1980). *Compendium of Soil Fungi*. Academic Press, London, p. 48

Ellis, M. B. (1976). More Dematiaceous Hypomycetes. Commonwealth Mycological Institute Pub., Kew Surrey, England. p. 25.

Eze, V. C. and Ogbaran, I. O. (2010). Microbiological and Physico-chemical characteristics of fish pond water in Ughelli, Delta State Nigeria. *Inter. J. Curr. Res.*, 8: 82-87.

Fraser, G. C., Callinan, R. B. and Calder, L. M. (1992). *Aphanomyces*species associated with red spot disease: an ulcerative disease of estuarine fish from eastern Australia. *J. Fish Dis*., 15: 173-181.

Gillman, J. C. (1957). *A Manual of Soil Fungi*. Oxford and IBH Publishing Co., New Delhi. p. 250.

Mastan, S. A. (2008). Incidences of Dermatomycosis in fishes of Larpur reservoir, Bhopal, (M.P*). J Herbal Med. Toxicol*. 2: 37-40.

Meyer, F. P. (1991). Aquaculture disease and health management. *J. Anim. Sci.*, 69: 4201-4208.

Ramaiah, N. (2006). A review on fungal diseases of algae, marine fishes, shrimps and corals. *Indian J. Mar. Sci.*, 35: 380-387.

Raper, K. B. and Thom, C. (1949). *A Manual of the Penicillia*. Williams and Wilkins, Baltimore. p. 875.

Roberts, R.J., Willoughby, L.G., and Chinnabut, S. (1993). Mycotic aspects of Epizootic Ulcerative Syndrome (EUS) of Asianfishes. J. Fish Dis. 16: 169-183.

Rosas, I., Calderon, C., Escamilla, B. and Ulloa, M. (1992) Seasonal distribution of *Aspergillus* in the air of an urban area: Mexico City. *Grana*, 31: 315-319.

Sati, S. C. (2002). Conidal aquatic fungi of Nainital, Kumaun, Himalaya, India. *Mycotaxon.*, 81: 445.

Schipper, M. A. A. (1984). A revision of the genus *Rhizopus* 1. The *Rhstolonifer*-group and *Rh. oryzae*. *Stud. Mycol.*, 25: 1-19.

Stolk, A. C. and Samson, R. A. (1983). The Ascomycetegenus *Eupenicillium* and

related *Penicillium anamorphs. Stud. Mycol. Baarn.,* 23: 1-149.

Subramanian, C. V. (1971). *The Phialide. In Taxonomy of Fungi imperfecti*. (B. Kendick (Ed.)), Toronto. University of Toronto Press. pp. 92-115.

Van der Plaats-Niterink, A. J. (1981). Monograph of the Genus *Pythium*. Studies in Mycology No. 21, Centraalbureau voor Schimmelculture. Baarn, The Netherlands.

Von Arx, J. A. (1981). The genera of fungi sporulating in pure culture. 3rd edn. (J. Cramer, Vaduz, (ed.)), p. 424.

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