

FUNGAL INFECTION IN SOME ECONOMICALLY IMPORTANT FISHES IN RIVER HIRAN OF JABALPUR

Saurabh Gupta^{1*} and Deepak Mishra^{**}

* Department of Biotechnology, Shri Guru Tegh Bahadur Khalsa College, Jabalpur (M.P.) India

** Department of Biotechnology, AKS University, Satna (M.P.) India
gupta.saurabh89@yahoo.com

ABSTRACT – It is commonly recognized that aquatic fungus can infect fish and cause illness. All freshwater fish, including those that are incubating eggs, may be susceptible to fungal infection. *Aspergillus species*, *fumigate*, *niger*, *nidulans*, *Alternaria tenuis*, *Saprolegnia ferax*, *Allomyces anomalus*, *Rhizopus sp.*, *Saprolegnia parasitica*, *Achlya prolifera*, and *Neurospora sp.* are the fungal species that cause havoc in fisheries. *Penicillium sp.* and *Aspergillus fungal sp.* are the two most prevalent fungus that cause infections.

INTRODUCTION

Fresh water fishes are an important protein source for people of many countries (Hussain *et al.*, 2011; Rubbani *et al.*, 2011). However, globally fish from freshwater and marine sources are in severe decline, driven in large part by economic and human population growth (Limburg *et al.*, 2011). Fish farming in various parts of the world has increased many folds in the last decade.

Fish culture has thus grown to be a significant global business with a high level of commercial importance. Fish health concerns have increased along with the expansion of fish culture. In Punjabi pond fish, bacterial hemorrhagic septicemia, lernaeasis, saprolegniasis, and anoxia are the most frequently occurring fish illnesses. Fungi targets fish, including adult fish, fingerlings, fry, and eggs. Since fungal spores may be found in all fish ponds and cause issues for stressed fish, fungal infections, also known as mycoses, are among the most prevalent diseases observed in temperate fish. A robust fish population can potentially become more susceptible to fungal infections as a result of poor water quality.. Most fungal infections invaded on external tissues and only few fungal infections affect the internal organs of fish.

Fish illnesses frequently cause significant financial losses for fish farms. If fish are under stress due to illness, unfavorable environmental circumstances, inadequate diet, population pressure, or overexploitation, fungi may become an issue. Additionally, they are able to adjust to appropriate environmental changes, which helps them ward off illnesses brought on by pathogenic infections. Most fungi are saprophytes and are heterotrophic. Since most saprophytic fungi are facultative parasites, parasitic fungi are also facultative saprophytes. But that depends on the circumstances at the time. The structural characteristics of fungi differ between species, genus, and families. The majority of fungal infections that affect freshwater fish primarily happen in the winter. High stock populations, inadequate habitat, and low water quality are examples of stressors. As a result fish become more susceptible to diseases (Khulbe and Bhargava, 1977; Hossain and Paul, 1993; Muniruzzaman and Chowdhury, 2008). Present study was aimed to investigate the fungal infection in pond water fishes.

MATERIAL AND METHOD

Collection of infected fish sample

Incidences of fungal infection were recorded during the research from River Hiran, Jabalpur M.P. The fishes were collected with the help of fisherman in sterile polythene bags in aerated water and transported immediately to biodiversity conservation and rural biotechnology centre, Jabalpur for mycological study. The fishes were kept separate in glass aquarium with continuous air supply at ambient temperature.

Isolation of fungal pathogens from infected fishes

Isolation of fungi from infected fishes was carried out by taking small pieces from muscles about 2 mm in diameter from different portions of body and washed thoroughly with distilled water. (Kumari *et.al.*, 2015, Eli *et.al.*, 2011) These tissues were then inoculated over plates containing on Potato Dextrose Agar medium for 5-7 days of incubation at a temperature ranging between 25°C to 28°C in the incubator was provided to the different isolated fungi.

Identification of isolated fungi

Identification and characterization were made by observing the colony colour and texture. The prepared slides compared with the authentic manuals of fungi. (Coker 1923; Khulbe, 1995; Bilgrami *et.al.*, 1991; Jamaludiin, 2004)

Maintenance of culture

The stock culture of fungi were maintained on PDA slant and stored at low temperature (4°C)

Determination of frequency

The present frequency of fungal species occurrence was calculated as follows:-

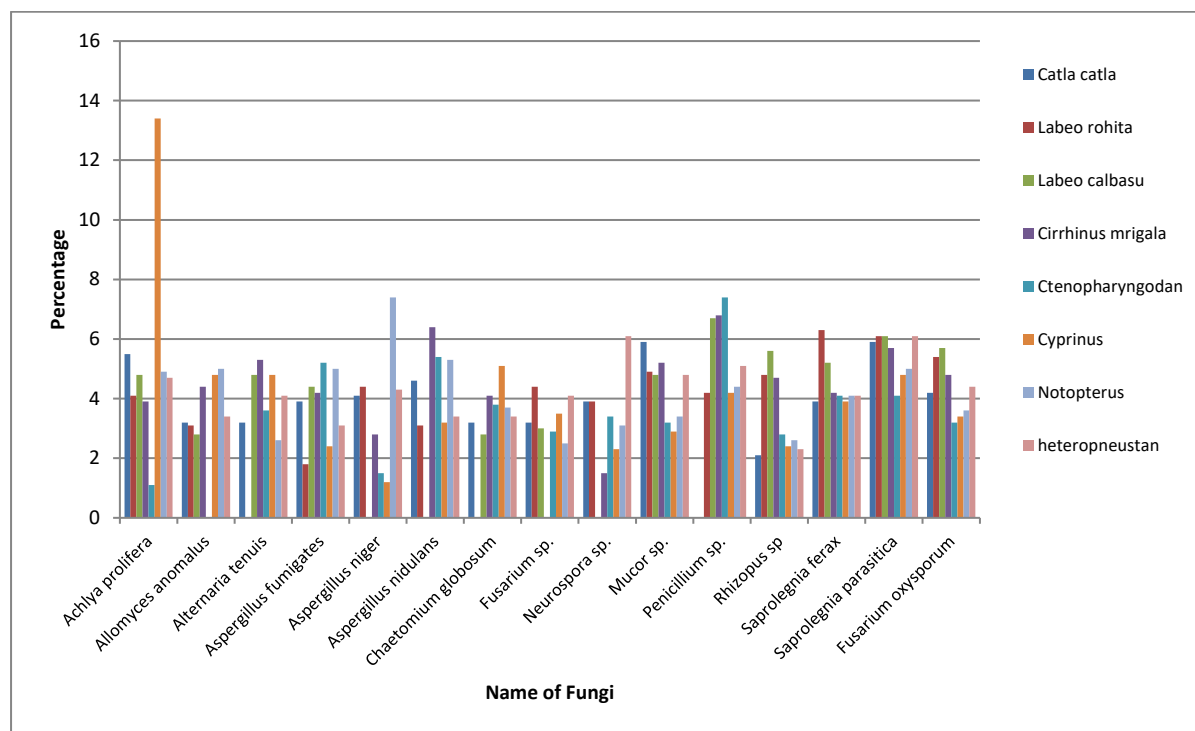
% of frequency of species

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

RESULT AND DISCUSSION

In all, fifteen fish were studied in this study, eight of which were shown to have fungal diseases: *Catla catla*, *Labeo rohita*, *Labeo calbasu*, *Cirrhinus mrigala*, *Ctenopharyngodon*, *Cyprinus*, *Notopterus*, and *heteropneustan*. These fish exhibit the classic clinical signs of a fungal infection, which include lesions, ulcerations, fungoid spots on the body, and skin that has been decolored and exposed. With three species, *Aspergillus* sp. was the most common type of fungus. Hatai, K. and G. Hoshai (1992), R.D. Khulbe and S.C. Sati (1981), and Hatai *et al.* (1994) have all described similar symptoms. *Aspergillus niger* and *Aspergillus nidulans* were the most prevalent species among the different *Aspergillus* fumigate. It was followed by *Alternaria tenuis*, *Saprolegnia ferax*, *Allomyces anomalus*, *Rhizopus* sp, *Saprolegnia parasitica*, *Achlya prolifera* and *Neurospora* sp. and minimum frequency was observed by *Penicillium* sp. (T.A. Qureshi *et al*, 2002, R.J. Roberts *et al*, 1993 and K. Hatai *et al*, 1994) Also reported pathogenicity of same on fishes.

Graph-1 Experimental infection isolate with various species of fungi from disease fishes



CONCLUSION

In this study, eight commercially significant freshwater fish species *Catla catla*, *Labeo rohita*, *Labeo calbasu*, *Cirrhinus mrigala*, *Ctenopharyngodon*, *Cyprinus*, *Notopterus*, and *heteropneustan* that were collected from Hiran River in Jabalpur are being investigated for fungal diseases. There were over fifteen fungus found. Genuine fungal manuals were used to aid in the identification and characterization of the fungi. They were separated, identified, and characterized, with the most prevalent ones being *Aspergillus* sp., *Achlya prolifera*, *Allomyces anomalus*, *Alternaria tenuis*, *Chaetomium globosum*, *Fusarium* sp., *Neurospora* sp., *Mucor* sp., *Penicillium* sp., *Rhizopus* sp., *Saprolegnia ferax*, *Saprolegnia parasitica*, and *Fusarium oxysporum*. The observations revealed that ponds of Jabalpur showed considerable intensity of fungal infection in fishes. It may be primary or secondary pathogen. Total 15 fungi were identified in 8 economically important fresh water fishes. *Aspergillus* sp. was found most virulent with maximum host range and most of the fishes were of economical impotent group.

REFERENCE

Bilgrami, K.S., Jamaluddin, S and Rhizwi, M.A (1991). Fungi of India List and References. (2nd revised edition), Today and Tomorrow's Printers and Publishers, New Delhi, pp. 798.

- Coker, W. C. 1923. The Saprolegniaceae with notes on other water moulds. Univ. of north Carolina Press. Chapel Hill. N.C.U.S.A.
- Elli Slaughter, Richard M Gersberg, Kayo Watanabe, John Rudolph, Chris Stransky, and Thomas E Novotny (2011) Toxicity of cigarette butts, and their chemical components, to marine and freshwater fish. *BMJ Publishing Group Limited*
- Hatai, K and G.Hoshaiai (1992) Mass mortality in cultured Coho salmon due to *Saprolegnia parasitica* coker. *J. Wildl. Dis.*, 28(4):532-536.
- Hossain M. S. and Paul S. K. (1993). Study of fish disease into the flood plains. In research progress report (June- September 1993). Fisheries Research Institute, Third Fisheries Project, Santahar, Bogra, October 1993. pp: 46 -52.
- Hussain SM, M Javed, A Javid, T Javid and N Hussain, 2011. Growth responses of *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* during chronic exposure of iron. *Pak J Agric Sci*, 48: 225-230.
- Jamaluddin, S., Goswami, M.S.G and Ojha, B.M (2004). *Fungi of India (1988-2001)*. Scientific Publishers, Jodhpur (Rajasthan), India, pp. 326.
- K.Hatai, K. Nakamura., S.A. Rah, K.Yuasa and S.Wada. *Aphanomyces* infection in Dwarf Gourami (*Colisa lalia*). *Fish Pathology*, 1994, 29 (2):95-99.
- Khulbe R. D. and Bhargava K.S. (1977). Distribution and seasonal periodicity of water moulds in some Lakes in Nainital Hills, India. *Hydrobiol.* 54: 67-72.
- Khulbe R.D., Joshi C. and Bisht G.S. (1995). Fungal diseases of fish in Nanak Sagar, Nainital, India. *Mycopathol.* 130:71-74.
- Limburg KE, RM Hughes, DC Jackson and CZ Brain, 2011. Human Population Increase, Economic Growth, and Fish Conservation Collision course or Savvy Steward ship? *Fisheries*, 36: 27-34.
- Muniruzzaman M. and. Chowdhury M. B. R. (2008). Ulcer diseases in cultured fish in Mymensingh and surrounding districts. 25(1): 40 – 49.
- R.D.Khulbe and S.C Sati, Studies on paracitic water molds of Kumaun Himalaya, host range of *Achlya Americana* Humphrey on certain temperate fishes. *Mykosen*, 1981, 24:177-180.
- R.J.Roberts, L.G.Willoughby and S.Chinabut, Mycotic aspects of epizootic ulcerative syndrome (EUS) of Asian fishes. *J.Fish Dis.*, 1993, 16: 169-183.
- Rashmi Kumari and Dr. Chandan Kumar (2015). Fungal infection in some economically important fresh water fishes in Gandak River near Muzaffarpur region of Bihar. *International journal of life science & Pharma Research*. VOL 5 Jan 2015, pp1-11

- Rubbani B, M Afzal, MS Mubarik, M Salim and SM Hussain, 2011. Estimation of apparent digestibility coefficients of soybean meal based diets with different protein levels for *Labeo rohita*. Pak J Agric Sci, 48: 231-235.
- S.C.Sati, Aquatic fungi parasitic on temperate fishes of kumaun himalya, India. Mycoses, 1991, 34(9- 10).
- T.A. Qureshi, R. Chauhan and S.A. Mastan, Experimental infection of saprolegnia spp. On different species of fishes. J. Nat, Con, 2002,.14(2):385-388.