



REVIEW OF RESEARCH

ISSN: 2249-894X

IMPACT FACTOR : 5.7631(UIF)

VOLUME - 11 | ISSUE - 4 | JANUARY - 2022



“STUDIES ON FUNGAL DISEASES OF FISH AND ITS MANAGEMENT : A REVIEW”

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ABSTRACT:

Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about fourteen million people in different activities. With diverse aquatic resources the country has shown continuous and sustained increments in fish production since independence. Constituting about 6.3% of the global fish production, the sector contributes to 1.1% of the GDP and 5.15% of the agricultural GDP. The total fish production of 10.07 million metric tonnes, presently has nearly 65% contribution from the inland sector and nearly the same from culture fisheries. However, occurrence of disease has become a primary constraint to sustainable aquaculture production and product trade, there by affecting the socioeconomic status of fishers in country like India.



KEYWORDS: *Fisheries, Aquaculture, Fish production and Fish health management.*

INTRODUCTION

There is global need for food and nutritional security especially amongst developing and under-developed countries. Fisheries in India, is a progressively growing sector with varied resources. It has been estimated that more than 14.50 million people at the primary level are directly or indirectly dependant on this sector for their livelihood security. The sector has shown significant growth from traditional culture practices to commercial methods of culture, enhancing fish production from a mere 7.5 lakh tonne in 1950-51 to 107.95 lakh tonne during 2015-2016, while earnings has of Rupees 33,441 crore in 2014-2015 through export of fish to different countries. Fisheries and aquaculture sector has achieved a significant overall annual growth rate of about 4% during the 11th Five Year Plan period. As such fisheries and aquaculture has made contribution of about 0.91% to the National Gross Domestic Production (GDP) and 5.23% to the agricultural GDP (2014-2015), which is very significant. At present India contributes about 6.30% to the global fish basket and 5% of global fish trade. India is the second largest fish producing country and hold second largest aquaculture producing nation in the world. While, Asia contributes more than 90% to the world's aquaculture production, India

now takes the second position with regard to annual fisheries and aquaculture production, only after China. As per FAO data, aquaculture has been the fastest growing food producing sector in the world, with an average annual growth rate of 8.9% since 1970, compared to only 1.2% for capture fisheries and 2.8% for terrestrial farmed meat production systems over the same period. During the year 2015-2016, the country has produced about Indian Rupees 1.0 lakh crore value fish for local consumption and export. This resulted in an unparalleled average annual growth rate of over 4.5 percent over the years which have placed the country on the forefront of global fish production. The country has plans to increase the fish production and productivity by 8 per cent annual growth rate and to reach 15 million tonnes mark by 2020. This sector is also a principal source of livelihood for a large section of economically underprivileged population of the country and more than 14.5 million people depend on fisheries activities. However, progress of aquaculture has caused some unwarranted activities both for the species and environment. At the same time, over-exploitation of fisheries and anthropogenic stress on aquatic ecosystems has placed pressure on wild fish populations. The consequence has been the emergence and spread of an increasing array of new diseases change. As has been noticed in other food producing sector, aquaculture has been adversely affected due to frequent occurrence of disease outbreaks mostly due to intensive culture practices for higher economic gain. This review examines the development and characteristics of freshwater aquaculture practices in India, major fish diseases, principle of disease diagnosis and control programme and future scope of development of freshwater aquaculture in India. It also considers the potential challenges for health management issues in aquaculture for sustainable development.

DISCUSSION :

Disease is one of the major constrains to aquaculture and limiting factor for economic and socio-economic development in India and as in many other countries of the world. Some diseases have caused serious damage, not only the livelihood of fish farmers, but also, to the future development of the industry. Many diseases affecting present day aquaculture is resultant of intensification of culture practices without the basic perception of intricate balance between host, pathogen and environment. In India, the increase in aquaculture production particularly in expansion into intensive and semi-intensive methods of production has been coupled by increase in fish and shellfish resulting from high stocking densities and stress conditions that favours the occurrence and spread of infectious diseases. A total loss of one billion was reported due to diseases in shrimp culture. The vertical expansion of fish culture with diversified species and higher stocking density has resulted more frequent occurrence of bacterial, parasitic and viral pathogens, often leading to higher morbidity or mass mortalities and lowered production. Rural resource poor farmers with little or no knowledge of fish health management and skill to prevent and control disease outbreaks are the most sufferers, incurring huge economic loss. It is understood that occurrence of disease is a result of the complex interaction between the host, the pathogen and the environment. In aquatic systems, disease management is a difficult proposition due to the unique ecosystem, where the pathogen is always looking for an opportunity when the health status of the host is compromised. In many cases, disease outbreaks are closely related to environmental deterioration, leading to stress to the cultured animals. Different stress factors such as non-optimal water quality, higher microbial load, poor nutritional status, high stocking density can trigger the chances of infection by opportunistic pathogens in aquatic environment. Most

bacterial, parasitic and fungal pathogens are not strictly parasitic micro-organisms. These pathogens have a high adaptability to environmental changes. If the conditions for parasitism are unsuitable, saprophytic relationship will develop. Environmental stress factors can result in increased occurrence of fungal infections. High organic loadings were also identified as a cause of increased infection of *Saprolegnia parasitica*.

India is basically a carp country and indigenous Indian Major Carps which include rohu (*Labeo rohita*), Catla (*Catla catla*), mrigal (*Cirrhinus mrigala*), exotic carps like common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*) silver carp (*Hypophthalmichthys molitrix*) along with catfishes (*Clarius batrachus*, *Heteropneustes fossilis*, *Pangassius* spp.) and freshwater prawn *Macrobrachium rosenbergii* also being widely cultured account for bulk of aquaculture production. In last few years, the exotic catfish *Pangasiandon hypophthalmus*, and pacu, *Piaractus brachypomus*, culture are also increasing. Also Tilapia and *Pangasius* offer opportunities, for cage culture freshwater lakes and reservoirs. Instead of 10 ton per ha, in pond culture system, now a fish production of 3.0 ton in a cage of 6ft × 4ft × 4ft can be achieved. The focus has been on the production of genetically improved tilapia for market of cheap source of proteins. However, carp production contributes to bulk of the fish production in Indian freshwater aquaculture, with production over 3.25 million tonnes. As there is limited scope for horizontal expansion, the current trend in aquaculture development is towards intensification of culture practices. However, frequent occurrence of diseases and epizootics are considered to be major bottlenecks for increasing production. It is estimated that disease account for 10-5% towards the production cost. The diseases are mostly of bacterial and parasitic origin and involvement of fungal pathogens and viruses are rarely reported in Indian aquaculture practices.

FUNGAL DISEASES OF FISH:

Contrary to bacterial and parasitic diseases, only a few numbers of fungal species are known to be pathogenic to fish. Mostly these are present in water and under unfavourable conditions; they attack the fish causing skin lesions. Most fungal infections recorded in carp culture are those caused by species belonging to the oomycete fungi, *Saprolegnia*, *Achlya* and *Aphanomyces*. Diseases caused by these fungi are collectively called "saprolegniasis". These oomycete fungi, are commonly present in aquatic environments, are rarely considered to be primary pathogens. These are often recognized as saprophytic, opportunistic secondary pathogens that readily colonise the damaged tissues infected by bacteria or parasites. Fungal growths on skin or fins look like patches of white to whitish-grey cotton-wool like growths. These are mostly composed of numerous fungal hyphae, which can be visualized under microscopic observation Saprolegniasis is particularly prevalent in over-wintering ponds with a high stocking density, like in cage culture or intensive aquaculture. Although there are several reports of saprolegniasis mostly in cage culture systems, the incidences are normally less in pond culture system, unless there is gross mismanagement. Besides *Saprolegnia*, *Branchiomyces* and *Aphanomyces* causes disease in pond aquaculture.

Another important fungal induced disease in fish culture of high economic importance is Epizootic Ulcerative Syndrome. It is widely occurred in freshwater aquaculture causing a great loss in South East Asia including India. It is a severe and economically important disease affecting farmed freshwater fish and listed as a notifiable disease. Haemorrhages and ulcers are the clinical manifestation of the disease symptoms on the body surfaces. It is an important bacterial-fungal mixed infection responsible for high mortality in freshwater fishes. Fish

species commonly affected are *Catla catla*, *L. rohita*, *C.mrigala*, *C. carpio*, *Channa sp.*, *Puntus sp.*, and *G. chapra*. Affected fishes become weak, off-fed and float on the surface of the water. Initially, red coloured lesions often with haemorrhages are seen on skin, which gradually becoming deeper and assuming the form of ulcers. In some cases tissues patches fall off, causing secondary infection and high mortality. Although a wide variety of organisms have been isolated from the body surfaces and internal organs of the fish, *Aphanomyces invadans* is believed to be the primary causative organism. A range of both biotic and abiotic factors may predispose fish to infection by Epizootic Ulcerative Syndrome, reported EUS to be the most common disease in Bangladesh that has a significant impact on carp culture they indicated that ponds receiving water from rice field and river/ditch had high relative risk of Epizootic Ulcerative Syndrome.

Farmers in the region are in practice of using various probiotic formulations, aqua drugs and chemicals, various antimicrobials, sanitizers, anti-parasitic drugs and even antibiotics in fish culture system, as preventive and control measures to protect the crops. Some drugs and preparations, which are used in animal medicine and agriculture practices are also being used in fish culture. CIFAX, a chemical formulation developed by the scientists of ICAR-CIFA, has been found quite useful in controlling Epizootic Ulcerative Syndrome and other bacterial infections, besides have some other useful actions in pond culture.

CONCLUSION:

Fisheries in India is an expanding industry, with varied aquatic resources and potential, engaging over 14.50 million people at the primary level and many more along the value chain. Transformation of the fisheries sector from traditional to commercial scale has led to an increase in fish production from 7.5 lakh tonne in 1950-1951 to 107.95 lakh tonne during 2015-2016, while the export earnings from the sector registered at around 33,441 crore in 2014-2015. In fish production, India is constantly at the second position after China. While, India has made a sufficiently fast progress in achieving production of 7.2 million ton, and aiming for doubling it by 2020, there remains an opportunity for further increasing the production of fish from inland water bodies like reservoirs, wetlands, lakes and canals. Cage culture has the potential application in such water bodies and the results in Chandil reservoir in Jharkhand, is encouraging. However, some important aspects which needs urgent attention for enhancement in fish production include stocking of right mix of fast growing fish varieties, specifically the improved disease resistance variety of IMC, easy availability of quality fish seed, implementation of scientific culture practices in community ponds or tanks. Again, anthropogenic activities leading to decrease water flow, loss of habitat and above all discharge of sewage and toxic factory effluents, polluting large sections of water bodies, coupled with indiscriminate fishing pressure have deeply impacted fish production from water bodies. Development of suitable preventive and control measures, specifically therapy for fish diseases assumes paramount significance, for the farmers to protect their crop against pathogens. Besides implementation of Better Management Practices is important to prevent frequent occurrence of disease and production loss in aquaculture. Further enhancement in knowledge about the disease process, host- pathogen and the environment interaction leading to disease occurrence, are very much essential for development of scientific methods of disease control programme. A good understanding of disease prevalence status, indigenous technologies for disease prevention and control, development suitable economic bio security programme and implementing farm-level Better Management Practices and husbandry measures are key

components, which must be given due attention for sustainable fisheries production in the region.

REFERENCES :

- Anon (2017) Aquaculture Production in India.
- Anon (2017) Cifax Fish Medicine, Agrawal Trading Company, Raipur, Chhattisgarh, India.
- CIBA (2015) Launch of All India Network Project on Fish Health. CIBA, Tamil Nadu, India.
- DADF (2016) Guidelines - Central Sector Scheme on Blue Revolution: Integrated Development and Management of Fisheries. Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India, India.
- FAO (2016) National Aquaculture Sector Overview, Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations for a world without hunger, India.
- Goswami C, Zade VS (2015) Statistical Analysis of Fish Production in India. International Journal of Innovative Research in Science, Engineering and Technology 4: 294-299.
- Jelte de Jong (2017) Aquaculture in India, Rijksdienst voor Ondernemend Nederland.
- Kumar Prem, Khar Sanjay, Dwivedi Sudhakar, Sharma Shiv Kumar et al. (2015) An Overview of Fisheries and Aquaculture in India. Agro Economist 2: 1-6.
- Mishra SS, Das R, Das BK, Choudhary P, Rathore R, et al. (2017) Status of Aqua-medicines, Drugs and Chemicals Use in India: A Survey Report. J Aquac Fisheries.
- Mishra SS, Dhiman M, Swain P, Das BK (2015) Fish diseases and health management issues in aquaculture. ICAR-CIFA Training manual No.18, Central Institute of Freshwater Aquaculture, Bhubaneswar, India.
- Monir Md, Shirajum, Bagum N, Rahman S, Ashaf-Ud-Doulah Mohammad, Bhadra A, et al. (2015) Parasitic diseases and estimation of loss due to infestation of parasites in Indian major carp culture ponds in Bangladesh. International Journal of Fisheries and Aquatic Studies 2: 118-122.
- Press Information Bureau (2017) Blue Revolution, Ministry of Agriculture, Government of India, India.
- Rajendran KV (2017) Health Management and Biosecurity in shrimp aquaculture in India- a review. In: Proceedings of International Symposium on aquatic Animal Health and Epidemiology for sustainable Asian Aquaculture. ICAR-National Bureau of Fish Genetic Resources, Lucknow, India.
- Sahoo PK, Pradhan PK, Sundaray JK, Lal KK, Swaminathan TR (2017) Present Status of freshwater fish and shellfish diseases in India. In : Proceedings of International Symposium on aquatic Animal Health and Epidemiology for sustainable Asian Aquaculture. ICAR-National Bureau of Fish Genetic Resources, Lucknow, India.
- Sandeep P, Chamundeswari Devi B, Kumar KP (2016) Present status of Parasitic and Bacterial diseases in Fresh Water Fish Seed Farms in East Godavari District, Andhra Pradesh. International Journal of Applied and Pure Science and Agriculture 2: 117-121.
- Suresh VR (2017) Sustainable Fisheries and Aquaculture. In: souvenir of National Seminar on Priorities in fisheries and aquaculture (ed.). ICAR-Central Inland Fisheries Research Institute, Barrackpore, India.
- Swaminathan TR, Kumar R, Dharmaratnam A, Basheer VS, Sood N (2016) Emergence of carp edema virus in cultured ornamental koi carp, *Cyprinus carpio* koi, in India, J Gen Virol 97: 3392-3399.



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