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ENVIRONMENTAL IMPACT ASSESSMENT OF FISH DISEASES IN FRESHWATER BODY OF VINDHYA REGION

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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. Parasites are ubiquitous, primarily surviving in a dynamic equilibrium with their host(s) and they are often overlooked in fish health assessments. Changes in the environment, both anthropogenic and environmental, can alter the parasite/host equilibrium and cause disease or mortality in fish. Therefore it is imperative that we have knowledge of both parasites and parasitic communities within a given population. When fish kills occur, it can often be associated with changes in parasite density and community composition. Often the damage associated with these fish is relative to the rate of infestation with the parasite; a fish that is lightly infected will show few signs of the parasite, while a heavily infected fish may become physiologically impaired and even die. Parasites can cause mechanical damage (fusion of gill lamellae, tissue replacement), physiological damage (cell proliferation, immunomodulation, detrimental behavioral responses, altered growth) and reproductive damage. As parasitism is the most common lifestyle on the planet, understanding its role in the environment may help researchers understand changes in a given fish population or stream ecosystem. As is understood, prevention of fish diseases assumes paramount importance in terms of sustainable growth of aquaculture sector in India, enhancing productivity, socioeconomic condition and livelihood security of fishers who are directly or indirectly dependent on this sector.

KEYWORDS: Fish Health, Parasites, Environment, Community

INTRODUCTION:-

In freshwater ecosystems, the opportunity for fish parasites to be moved between regions by anthropogenic activities is high given that the rate of introduction of non-native fishes has doubled in the last 30 years, mainly due to the globalization of aquaculture.

Researching environmental stressors on fish health generally combines investigating emergent health issues associated with genetics, histopathology and pathogens. Many times, the pathogens of interest are those commonly associated with disease (i.e.: viruses, bacteria, nutrition, and pollution). As such, in many fish health assessments, the role of parasites on fish health can be overlooked. Their presence is usually only a concern when they affect a fish species of interest, or cause detrimental effects to the economy or a recreational activity, or a commercial fishery.

Parasites have a wide range of distribution in all groups of animals. They are more abundant than free-living animals, and may be found in every phylum of animal from protistan to chordates. A large number and diversity of animal species are capable of patrasitising fish, ranging from microscopic protozoans to easily visible crustaceans and annelids. Most of the fishes, either wild or cultured, are infected with parasites. They not only serve as the host to different parasites, but also serve as carriers of many larval parasitic forms that mature and cause serious diseases in many vertebrates, including man. Parasites exhibit marvelous strategies for adaptation to their hosts. Many parasite species are host-specific to some extent and are capable of infecting one or only a limited number of host species. Individual parasite species may also have widely differing effects on different host species (Roberts 2012). Some of them are parasitic in the external surface of fish; others are parasitic in the internal organs. They can infect fishes in different stages of their life, as well as different aquatic environmental conditions, and are also considered to be

biological indicators of environmental pollution. Parasites interfere with the nutrition, metabolism, and secretory function of the alimentary canal, damage nervous system, and also upset the normal reproduction of the host.

AIMS AND OBJECTIVES:-

The aim of the work was to evaluate long-term results of studies focusing on improving the methods for preventing and treating fish diseases using selected natural and synthetic immunomodulators and vaccines in fish culture.

MATERIALS AND METHODS:-

During the survey on fish production statistics nursery operators, fish farmers and fishermen from each of the study areas were interviewed for production statistics. The survey was done through questionnaire and participatory rural appraisal methods in districts in Vindhya region namely Rewa, Sidhi, Singrauli and Satna districts. The research work was conducted during July 2017 to June 2018. The water quality was measured with the filed Hach Kit. Disease was observed with naked eyes first, then by magnifying glass and by the movement and behavior. After having removed the fish from the water, the colour of the body was noted. The skin was always examined with a magnifying glass. It was determined whether there were deformities of the vertebral column and of the mandibles, or perforation and /or shortening of the opercula. Finally the anus was examined for any swelling, and the texture of the muscle was determined to see whether any ulcer or inflammation were present. The diseases were identified according to the methods of Amlacher (1961).

RESULTS AND DISCUSSION:-

Fish disease has got inverse impacts on fisheries resources. Economic losses due to fish diseases were investigated. At present fish parasites and other pathogen are causing heavy economic loss due to mortality and morbidity of carp brood stock. Infected market size fish may become unsuitable for human consumptions due to heavy infestation causing serious economic loss to the poor farmers. The impacts of diseases on fisheries resources are presented in Tables from 1 to 2. During the period of 2017-2018. The average optimum fish production in pond is recorded 3605 Kg/ha and that of in Dams and river is 370Kg/ha in Vindhya area. Average fish production loss due to different type of diseases like bacterial, fungal, protozoan, monogenean, crustacean, Malnutrition, O_2 deficiency and water pollution is 48.10%, 22.60%, 36.0%, 34.0%, 23.70%, 5.30%, 9.40% and 14.90% respectively and overall loss 24.25% (Table 1).

Table 1:- Depletion of Fish production due to fish disease and water pollution in Vindhy Region M.P.

Type of Disease /other factor	Optimum production of fish (Kg/h)		Production loss (due to disease) (Kg/h)		Average loss (%)
	Pond	Dams & River	Pond	Dams & River	
Bacterial disease	3605	370	2123	140	48.10
Fungal disease	3605	370	1135	86	22.60
Protozoan disease	3605	370	1641	130	36.0
Monogenean	3605	370	1567	120	34.0
Crustacean	3605	370	1196	70	23.70
Malnutrition	3605	370	455	60	05.30
O_2 deficiency	3605	370	641	40	09.40
Water pollution	3605	370	826	80	14.90
Mean	3605	370	1198	90.75	24.25

Table 2: Fish mortality due to disease in four districts during June 2017 to May 2018

Type of Disease /other factor	Mortality of fingerlings (%)	Mortality of adult fish (%)	Average Mortality of fish (%)	More affected fish
Bacterial disease	30	68	49	Adult Fish
Fungal disease	20	40	30	Adult Fish
Protozoan disease	60	50	55	Fingerlings
Monogenean	64	52	58	Fingerlings
Crustacean	35	45	40	Adult Fish
Malnutrition	10	16	13	Adult Fish
O_2 deficiency	40	30	35	Fingerlings
Water pollution	33	25	29	Adult Fish
Mean	36.5	40.75	38.62	

The losses occurring due to diseases in aquaculture systems sometimes can be very frustrating especially to the rural poor and small scale fish farmers. Economic losses due to fish diseases could be as high as Tk. 26,817/ha/year and average disease control cost was Tk. 2,905 /ha/year (Faruk et al, 2004). Mohan (1999) reported those ectoparasites, protozoan, monogenetic trematodes, fish lice, endoparasitic protozoans are some of the very important pathogens that have had significant impact on the yield in carp hatcheries and seed production centers in India. Perhaps parasite acts either as a pathogen or vector for diseases (Roberts et al., 1986). Hossain et al. (1994a) reported that highest mortality of carp fingerlings were reported from nurseries infected with protozoan and monogenean parasites. Fish fry at the young stage become more susceptible to pathogen because of their immature immune system (Anderson, 1974), which support the present findings. Assistance of farmers from Government and non-government sectors on fish health management are very rare. There is a risk to livelihoods of fish farmers and fishermen from fish disease and fish health problems. Rural farmers were mostly resource poor with little or no knowledge of health management and had inadequate opportunities to improve management skills. Their ability to respond effectively to fish disease problem was also very limited. As a result, they suffered from financial losses due to fish disease. So prevalence offish diseases had negative impacts in fish production. About 14% of the actual production could be loss due to fish disease (Faruk et al. 2004). Fish farmers have been utilizing pesticides to control Argulus infestations. Due to indiscriminate use of pesticides, the pond environment has been deteriorating affecting the productivity of pond adversely (Ahmed 2004). It was observed that the Bangladeshi farmers are using pesticides excessively as a quick treatment for the Argulus sp., which is posing a major threat for sustainable carp culture development in the country. The pesticide is not only killing the Argulus but also affecting the abundance of crustacean planktons and many other non-target species (Ahmed 2004). Prolong use of pesticides in the ponds may create environmental hazards which may lead to threat to the consumers. Disease reduces growth and survivability of fish, which reduces reproduction of fish and hence lowers the fish population. Ultimately this leads to loss of fish production.

CONCLUSION:-

Most fish health problems occur because of environmental problems: poor water quality, crowding, dietary deficiencies, or “stress”. The best cure for any fish health problem is prevention. Good water quality management and proper fish husbandry techniques will eliminate most parasites described here. Information concerning basic fish culture, pond management, water quality, and economics is available in aquaculture extension circulars from your Cooperative Extension Service agent.

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