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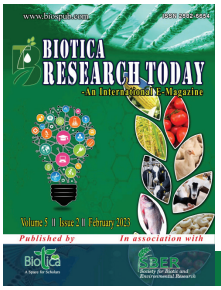

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Development and Strategy Fish Health Management in Aquaculture

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Abstract

Different types of diseases also occur in fishes like humans and animals. The most prevalent fish diseases, especially in freshwater fish ponds, are columnaris, gill disease, ick (ich), dropsy, tail and fin rot, fungal infections, white spot disease, pop-eye, cloudy eye, swim bladder disease, lice and nematode worm infestation, water quality-induced diseases, constipation, anorexia, chilodonella, ergasilus, tuberculosis, glugea, henneguya. Fish are responsible for transmitting parasites in the water, which subsequently make them exposed to diseases. Due to disease, there are more deaths in fishes because the fish eat less food, due to which their body's activities are affected. Viruses, bacteria, fungi, protozoan, water mould infections, as well as nutrient excesses and shortages, are some of the causes of diseases in fish. Prevent fish mortality due to disease by regulating the pond, fish diet, over fish stoking *etc*.

Keywords: Aquaculture, Development, Fish disease, Strategy

Introduction

Disease poses a great threat to fisheries. Due to the problem of diseases in the pond, there is a loss of about 10-15% of the production cost, sometimes all the fishes die in pond. Taking care of ponds and hatcheries is very important to prevent disease. Farmer brothers do fish farming in large numbers in the pond, due to which if there is a slight negligence in the management of the pond, then the entire crop gets destroyed. Today we will discuss some important diseases in fishes, diagnosis and some signs of the disease, some things about the control of diseases. If our ponds and hatcheries are poorly managed, then the mortality rate in fish increases the risk of disease increases. Therefore, by making proper management of our pond and hatchery, we can avoid the loss of fishes due to diseases. The water quality of the pond or fish farm plays a very important role in preventing of disease, or causing disease. By balancing it, fishes can be saved from diseases. Fish should be given balanced food and at the same time it should be seen whether the fish is eating the whole food or not, if the food is not eating well then there will be loss of food and food will degrade in the pond. Due to which various types of bacteria, parasitic fungi, etc. are born in the pond, become the cause of the disease, if any symptoms of diseases are seen in the pond, then immediately consult a fish doctor or fish specialist (Sharma *et al.*, 2012).

Cause of Diseases in Fishes

- Due to water pollution.
- Acidic or alkaline water.
- Decrease or increase in water temperature.
- Harvesting more fish seed.
- Due to the high amount of substances like zinc, mercury, copper, cadmium *etc*. in the water, they get deposited on the body of the fish and which makes a wound on the head.
- Unbalanced fish diet.

Some Important Signs of Disease, Infection (Disease) in Fishes

There are signs of different diseases in fish such as loss of appetite, lack of good growth in the body, repeated breathing (gulfing) of fishes coming to the surface of the water, jumping repeatedly on the surface of the water, rubbing against the dam of the pond, slow movement in fishes, fins, gills and skin rot. Small specks of blood appearing on the body of the fish, not eating well, change in color of

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fish, a sticky fluid that comes out from the surface of the fish body. On the fish body, there is a wound (spot) that is red, white, blue, and black. Loss of physical balance of the fish, fish swimming slowly on the surface of the water in a pond, eyes blurred, Eye rot, and eye protrusion. Belly is bloating (Sen and Mandal, 2018).

Precautions for Disease Management in Fish Farming

• Use lime, $KMnO_4$ in the pond from time to time.

• Check the environment and pond water quality, then stock the seeds in the pond, otherwise do not do it until it is fine.

• Before harvesting the fish, dry the pond and leave it for some time. Due to which the harmful bacteria, fungi, insect moths, unwanted, useless fishes, weeds *etc*. get eliminated in the pond. After the pond dries up, remove the aquatic weeds, snail *etc*.

• Use certified seed in the pond which is disease free and of good quality.

• Do not stock more seeds in the pond.

• Give balanced food to the fishes 2-3 times a day.

• If we are transferring one-year-old fish from one pond to another, then first treat the fish.

• If disease has been found in a pond, then after drying the net and treatment, used in it, it should not be otherwise it should not.

• Protect the fish from dog, snake, animal which harms it. Carry the dead diseased fishes somewhere far away on the pond and burn them or bury them in the soil.

• Get the sick fish out of the pond and separate it after treatment.

• Do not collect fish in the pond which fight with each other.

• Send the patient fishes in a polythene bag to the laboratory for examination, if sending live fish, and then send it in a polythene bag with oxygen and water.

• When the sky is cloudy, then the fish should not be given supplementary food at that time.

• If the color of the water becomes green and the water starts to smell, then the use of dietary supplements should be stopped.

• If you see signs of diseases in the fish, immediately contact the fish doctor or fish specialist.

Major Diseases in Fish Farming

Protozoan, fungal, bacterial, viral, crustacean, and helminthes infections, and many others, can affect fish in different ways. Table 1 in this article lists some of these illnesses (Mishra *et al.*, 2017; Lio-Po *et al.,* 2001; Noga, 2010).

Table 1: Common disease in aquaculture

Sl. No.	Disease Condition	Symptoms	Involvement of Pathogens	Treatments
1.	Columnaris Disease	Lesions that are hemorrhagic and ulcerative and may appear yellow to orange due to bacterial development and pigmentation on the fins, head, and back.	*Flavobacterium columnare* (*Flexibacter/ Cytophaga columnaris*)	• Change water. • Add aquarium salt Treat with copper sulphate or antibiotic.
2.	Tail rot and Fin rot	Erosions, discoloration and disintegration of fins and tails of fishes.	*A. hydrophila, Pseudomonas* spp., *Cytophaga* spp., *Haemophilus* spp.	• Give dip treatment to infected fish with copper sulphate for 1 to 2 min. @ concentration of 2 mg l^{-1}.
3.	Swim bladder stress syndrome or Environmental disease	Swim bladder hyperinflation, excessive positive buoyancy, and increased mortality.	Environmental issues.	• Keep an eye on dissolved oxygen (DO). • Avoid algae blooms, maintain the effectiveness of waterlines and pumps, and ensure adequate water exchange.
4.	Gas bubble disease	Bubbles can be seen in the stomach, eyes, skin, gills, fins, mouth, swim bladder, digestive tract, and exophthalmia in affected fish.		
5.	Aeromoniasis or *Motile aeromonas septicaemia*	Lesions with haemorrhage and ulceration on the head, the fins, and the exophthalmia.	*Aeromonas hydrophila, A. veronii bv. Sobria, A. sobaria*	• Avoid over stocking in fish farming.

Table 1: Continue...

Sl. No.	Disease Condition	Symptoms	Involvement of Pathogens	Treatments
6.	Edwardsiellosis or *Edwardsiella septicaemia*	Internal organ, skin, fin, and body ulcerative abscesses as well as rectal protrusion.	*Edwardsiella tarda*	• Water quality management in fish farm. • Reduce stocking density. • Apply oxytetracycline at 55 mg kg^{-1} fish for 10 days.
7.	Eye disease	Cataracts harm the cornea, the eyeball turns red and putrid, eventually the eye becomes damaged and drops.	*Aeromonas liquefaciens, Staphylococcus aureus*, various other bacteria	• According to their weight in fish food, potash 2-3 ppm. • Teramycin 70-80 mg is given for 10 days. Streptomycin 25 mg kg^{-1} by weight injected in the fish body.
8.	Pseudomoniasis/ *Psedomonas septicaemi*	Skin, fins, and tail haemorrhages.	*Pseudomonas* sp., *Pseudomonas fluorescens*	• Avoid over fish stocking. • Maintain water quality.
9.	Saprolegniasis	Fish become sluggish, skin bleeds and ulceration, and cotton wool grows on them with grey spots.	*Saprolegnia parasitica*	• Make a 3% solution of common salt and use it. • It is recommended to apply a bath treatment with NaOH (1025 g L^{-1} for 10-20 min), $KmNO_4$ (1 g in 100 L of water for 30-90 min), or $CuSO_4$ (5-10 g in 100 L of water for 10-30 min). • If there is a small pond, then using 1 g malachite green at the rate of 5-10 m, water can be beneficial.
10..	Branchiomycosis (Gill rot disease)	Fish with melting and decaying gills (redness of gills that later turn greyish-white, necrosis of gill filaments) have trouble breathing as a result, which causes them to reach the surface of the pond and repeatedly open and reopen their mouths in an effort to breathe.	*Branchiomyces demigrans*	• Uses lime at the rate of 50-100 kg ha^{-1} in the fish pond. • By making a solution of 3-4% salt, the fish affected by the disease are immersed for some time. • If the pond is deep, use copper sulphate at the rate of 8 kg ha^{-1}.
11.	Tail and fin rot	Fin and tail rot	*Aeromona hydrophila* and *Pseudomonas fluorescens*	• Caring for water quality. • Adding folic acid to the fish that feed it. • By Copper Sulphate (NilaThota), water is treated with a solution of 1:3000 and 1:2000 parts for one or two minutes. • The fish is kept for 3 minutes by making akiflavin 1% solution at the rate of 100 mg in 1000 litres of water.
12.	Black spot disease (Diplostomyosis)	On the body of the diseased fish, black patches emerge.	*Diplostomyosis* spp.	• The parasite's life cycle must be broken. • Should be protected from snails or birds.

Table 1: Continue...

Sl. No.	Disease Condition	Symptoms	Involvement of Pathogens	Treatments
13.	Epzootic Ulcerative Syndrome (EUS)	High mortality, skin redness, ulcerative spots, and sluggish behaviour in fish.	*Aphanomyces invadans* sp. (Fungs), *Aeromonas hydrophila, A. sobria*	• Using lime at the rate of 600 kg. • CIFAX is used by making a solution in 1 litre of water.
14.	Ulcers	Affected fish develop wounds on their heads, fins, and entire bodies.	*Aeromonas* and *Pseudomonas* spp.	• Potassium permanganate should be used in the pond at the rate of 5 mg. • CIFAX should be used after making a solution in 1 litre of water.
15.	Protozoan disease	Small spots start to form on the body and gills of sick fish.	*Ichthyophthirius multifiliis, Cryptocaryon irritans*	• Make a solution of 50 ppm of formalin and do it for 10 minutes. • Do this for 10 minutes in a solution of 1:500 glacial acidic acids.
16.	Ichthyophthiriasis (Ich/ White spot disease)	Fish are generally vulnerable. Whitish cysts of around 1 mm diameter, mostly fund on skin, fins and gills, Excess mucus from the body, Small white rash appears on the affected fish.	*Ichthyophthirius multifiliis*	• Dip the fish daily in a solution containing 200 ppm of formalin; this is done for about 7-10 days, using 2% common salt, if the benefit is not visible on the 7th day.
17.	Trichodiniasis	Fish are generally vulnerable. Observed are whitish cysts on the skin, fins, and gills, under a microscope, disc-shaped, spherical cysts can be seen in the white substance.	*Trichodina* sp.	• 2-5% salt solution for 2-5 minutes every 3-4 days (carp fry). • 100 ppm formalin and 10 ppm acriflavin for one hour throughout the course of three days.
18.	Dactylogyrusis (Gill fluke)	Mostly affects gills, destroying the gill filaments, gills with clumps of white masses.	*Dactylogyrus* spp.	• Treat for 10 minutes after adding 100 mg^{-1} (or 380 mg gallon^{-1}) of mebendazole.
19.	Gyrodactylosis (Skin fluke)	These parasites, whose gills contain clusters of white masses that develop on and destruct the skin, are commonly linked to secondary diseases.	*Gyrodactylus* spp.	• For small monogenean species, freshwater or saltwater baths usually work best. Certain large species, including some huge capsalids, may need a follow-up formalin or organophosphate treatment 48 hours later.
20.	Argulosis (Carp lice)	The fish's body is covered in red patches and ulcers that are caused by secondary germs, and it appears feeble overall. Fish with the infection secrete an excessive amount of mucus. Fish with the disease approach the pond's bank and brush it against the earth. A little worm can be spotted on the fin and upper body of fish from the Argulus species that are afflicted.	*Argulus* spp.	• Pond water should be changed and cleaned. • Fish of feeding nature like Gambusia should be reared in the pond. • 35 ml Sapermethrin can be used by putting it in water, using it 3 times at an interval of 5-5 days can kill the fish zoo (argulus). • Concentrations of Gamxene 0.2 ppm should be repeated at weekly intervals. • Potassium paramagnet by making a solution in 10 mg l^{-1} of water and taking bath for 10-30 minutes gives benefit, this method is not used much because the color of the water changes.

Table 1: Continue...

Sl. No.	Disease Condition	Symptoms	Involvement of Pathogens	Treatments
21.	Epizootic Ulcerative Syndrome (EUS)	Decrease in appetite and darker discolouration. Fish bodies can be seen to have ulcerative lesions.	*Aeromonas hydrophila, Aphanomyces invadans, Aphanomyces strains, Saprolegnia* spp. and *Pythium* spp.	• Coptrol at 5 ppm (a chelated copper compound). • Malachite green, 0.1 mg L^{-1}.
22.	Anchor Worm (Larnia)	Fish bodies have apparent wounds and spots, and the absence of blood, makes the fish appear weak.	*Lareniasis* spp.	• Make a solution of 0.1 of potassium permanganate and use both treatments. • Bath treatment with 1:1000 glacial acetic for 5 minutes immediately followed by immersion in 1% salt solution for 1 hour.
23.	Dropsy	The internal organs and abdomen of the fish affected by this disease fill with water, resulting in bloating in the stomach of the affected fish.	*Aeromonas hydrophila*	• Proper and balanced diet should be given. • The quality of water should be maintained. • Use lime at the rate of 100 kg ha^{-1}, do this 2-3 times at an interval of a week.

(Source: Mishra *et al*., 2017; Lio-Po *et al*., 2001; Noga, 2010)

Conclusion

For the region to produce fisheries sustainably, it is essential to have a thorough understanding of the status of disease prevalence, indigenous technologies for disease prevention and control, the development of an appropriate economic bio security programme, the implementation of farm-level BMPs and husbandry measures. The farmer brothers should take steps like before fishing in the pond, using the net after treatment, managing the water quality of the fish farm, stopping overfeeding, dumping ill fish in the soil, *etc*. to protect the fish from diseases and to prevent the harm caused by them.

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