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## FISH DISEASES AND THEIR MANAGEMENT

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### Factors of Disease

Most of disease outbreak is observed during fluctuation of temperature or changes in the environment. The common factors of diseases are as followings:

- Changes in water quality such as: Temperature, Dissolved Oxygen, CO<sub>2</sub>, pH, Transparency, Turbidity etc.
- Waste products make water polluted so that gills, skin, and mouth cavity become infected.
- Excess use of organic matters and food produce harmful gases such as H<sub>2</sub>S, Ammonia, Methane, CO<sub>2</sub>, which are responsible for fish disease.
- Mixing of polluted water from sewage, factory, town or city makes pollution in water.
- Runoff water from agricultural field, flooded area and other ponds make polluted water.
- Fluctuation in temperature and high stocking density may cause stress in fishes.
- Over feeding may cause water pollution.

**Symptoms of Disease :** Common symptoms of disease are following:

- Isolation from group, differences in behavior and swimming.
- Abnormal position, stop feeding or reject food intake.
- Changes in body physique, shape, colour i.e., discoloration of body.
- Edges of fins become whitish, reddish, removal of scales.
- Accumulation of water or reddish fluid in the body and roots of fins.
- Stomach swollen, necrosis of gills, secretion more mucous.
- Body swelling followed by spots, abrasions, furunculosis, ulcer or wound with fungal infection.
- Sudden movement and jumping off the water, rubbing the body against rough surface, pond dykes, aquatic plants etc., improper respiration and movement.
- Movement on own axis, backward or forward, tail down or head down, oblong, vertical or horizontal, imbalanced body.
- Exophthalmous or endophthalmous with swelling or bulging eyes, improper vision.

### Precautions and Treatment

Precautions and Treatments to prevent fish from disease are based upon mode of application of practices, chemicals, medicines etc. as per requirement:

**i. Disinfection of ponds and tanks:** Pond management is based on the application of 50-100kg bleaching powder per hectare during pond preparation. Quick lime is used @ 400-600kg / h in new ponds and 500-800kg/ h in old ponds to eradicate microbes and pathogens. Fish stock can be treated with 5ppm formalin or 0.5-2.0% salt solution prior to stocking in the pond. 5kg KMnO<sub>4</sub> and 5-liter formalin can be used in new ponds. 10kg KMnO<sub>4</sub>, 10kg CuSO<sub>4</sub> and 10liter formalin can be used in old ponds.

**ii. Disinfection of instruments:** The instruments related to fish culture should be disinfected with 5-25ppm formalin or 250 ppm KMnO<sub>4</sub> after proper washing and complete sun drying before using in the pond. Never use instruments from others pond.



**iii. Proper diet:** Fresh and healthy feed having 24% protein and sufficient fat, lipids, vitamins and minerals should be used 2-3 times in a day. Poor quality food may cause slow growth and weaken the fish.

**iv. Grading of fish:** Fish should be stocked in separate ponds according to the size, species and stages to prevent the mortality due to competition of food and space. There should be separate tanks and ponds for brooders, fries, fingerlings, yearlings and juveniles.

**v. Eradication of diseased and dead fishes:** diseased fish can be eradicated and treated till healthy condition. Dead fishes should be taken out from the pond and buried away from ponds and hatchery.

**vi. Primary treatment:** This treatment is done with the help of KMnO<sub>4</sub>, common salt solution, formalin and CuSO<sub>4</sub>. Generally, 2-3% salt solution is used as bath treatment for 1-2 minutes. KMnO<sub>4</sub> is @ 100- 250ppm for 2-3 minutes as bath treatment. KMnO<sub>4</sub> is applied @ 2.5kg/h in each month. Slacked lime is used @ 100-200kg/h every month. Netting is required twice a month or after 20 days. Water exchanges up to 30cm should be done per month. In severe infection different medicine or chemicals could be used according to the diagnosis of disease. Oxytetracyclin antibiotic antibiotics can be mixed with fish feed @50-60mg /100kg fish up to 15 days. Also, an injection of streptomycin 25mg and Penicillin 20,000IU can be given to valuable and costly fish more than 1kg body weight.

### Viral Disease

Disease	Causative agent	Symptoms	Treatment
Viral hemorrhagic septicemia (VHS) or Egtved disease	<i>Viral hemorrhagic septicemia virus</i> (VHSV, or VHSV)	Bulging eyes, bloated abdomens, bruised-looking reddish tints to the eyes, skin, gills and fins.	Chlorine <u>bleach</u> kills the VHS virus
Infectious hematopoietic necrosis virus	A negative-sense single-stranded, bullet-shaped <u>RNA virus</u>	<u>Abdominal distension</u> , bulging of the eyes, skin darkening, abnormal behavior, <u>anemia</u> , and fading of the <u>gills</u> .	No treatment had yet proven to be effective. To prevent the disease, strict isolation, hygiene, and testing procedures should be in place.
Spring viremia of carp	<u>Rhabdovirus</u>	External hemorrhaging, pale gills, and ascites.	Currently efforts have been made to prevent infection by the virus through the development of DNA vaccines and immunostimulatory therapeutics.



## Bacterial Diseases

Disease	Causative agent	Symptoms	Treatment
Columnaris Disease or "Cotton wool" disease	<i>Flexibacter columnaris</i>	Grey whitish spots appear on the head and fins, gills and lateral sides of body. These spots become ulcerated with reddish colored periphery around the lesion.	Use KMnO <sub>4</sub> @ 2-3ppm in the fish pond. Bath the fish in 1-2ppm KMnO <sub>4</sub> solution. For bigger fish more than 1kg give injection of 25mg streptomycin and 20000 IU penicillin per kg body weight of fish. Provide Nitrofurazone in fish feed @ 6.5 g /100 kg fish/day.
Bacterial Hemorrhagic Septicemia (BHS)	<i>Aeromonas hydrophila</i> , <i>Pseudomonas fluorescense</i> , <i>A. liquefaciens typus</i> (or <i>forma</i> ) <i>ascitae</i> .	Accumulation of red fluid in body cavity; other symptoms include destruction of liver cells, green or yellow coloration of liver, necrosis of skin and inflammation of the blood vessels. Exophthalmia (bulging eyes).	Use 2-3ppm KMnO <sub>4</sub> in the fish pond; use Terramycin @ 65-80mg /kg fish body weight up to 10 days. Give injection of streptomycin 25mg and Penicillin 20000 IU per kg body weight of fish, only for bigger fish more than 1 kg.
Edwardsiellosis	<i>Edwardsiella tarda</i>	Removal of scales, causing skin lesions and damage of muscle tissues. Many gaseous wounds appear on the skin, causing bad smell.	Use tetracycline or sulphonamide @ 8-12 mg/kg fish with fish feed. Provide bath treatment in 1:20,000 copper sulfates solution for 15 minutes. Put the fish in 0.04ppm iodine solution for 2 hrs. Improve the water quality hygiene food and stocking density.
Vibrosis, pike pest, or pike vibriosis	<i>Vibrio anguillarum</i>	Dark skin oozing bloody exudates; accumulation of fluid in body cavity; Exophthalmia with white spots.	Use vaccination in proper way. Provide the Oxytetracycline and sulphonamide or nitrofurazone @ 8-12 mg/kg feed. Disinfect the pond with slacked lime.
Furunculosis	<i>Aeromonas salmonicida</i>	Hemorrhagic septicemia, ulcerative appearance from blood capillaries to skin releasing of blood-stained fluid into water.	Provide rational vitamin rich food to fish. Foreign material should not be allowed in the fish ponds and hatcheries. Use sulfonamide @ 5g/100 kg fish per day and also use Chloramphenicol and Oxytetracycline @ 5-8 g/ 100 kg of fish per day with feed.
Fin Rot or tail Rot	<i>Aeromonas fluorescence</i> and <i>Pseudomonas putrificiens</i>	Outer edges of fins become slightly cloudiness, and at advance stage of disease the tissues of fins and tail get necrosed and finally the tail and fins disappear.	Use long bath in acriflavine @ 10gm/100-liter water or sulfonamide @ 10gm/100-liter water; use dip treatment with emequil @ 10 ml/100 lit for 24-48 hrs. For bigger fish more than 1kg weight give injection of antibiotic Kanamycin @ 20mg/kg body weight fish, disinfect the tanks, raceways with chlorine and copper sulfate (1:2000).



Disease	Causative agent	Symptoms	Treatment
Dropsy	<i>A. hydrophila</i>	Gills become pale in colour, exophthalmia, anus becomes swelling with red coloration, bulging eyes and heavy tummy; fish swim near the surface of pond.	Disinfect the pond with slacked lime @100kg per hectare. Use Oxytetracyclin or Chloromycin @ 5mg per kg fish.
Epizootic Ulcerative Syndrome	<i>A. hydrophila</i> , <i>A. salmonicida</i> , <i>Pseudomonas fluorescens</i> , <i>Saprolegnia ferox</i> , <i>Aspergillus</i> sp. <i>Aphanomyces invadans</i> etc.	Mouth of fish becomes deformed as cauliflower disease. Several red ulcers are formed on the skin of fish.	Provide bath treatment of fish with copper sulfate @ 100-200g/100litre water. Spray 1-2kg copper sulfate per hectare. Apply slacked lime @ 400-600kg per hectare pond. Apply Potassium permanganate @1-2kg per hectare. Apply Cifax or Tinchlor iodine@ 1-2liter per hectare.
Bacterial Kidney Disease	<i>Renibacterium salmoninarum</i>	Kidney becomes swollen; cysts are formed in posterior kidney. A bloody turbid or yellow brown fluid often accumulates in the abdominal cavity and around the heart. The intestinal tract may contain a white or yellow viscous fluid.	Use erythromycin phosphate @1.0mg per kg body weight of fish. Provide bath treatment in 2ppm erythromycin phosphate solution up to 1hr.

### Fungal Diseases

Disease	Causative agent	Symptoms	Treatment
Saprolegniasis and Achlysis	<i>Saprolegnia ferox</i> , <i>S. parasitica</i> , <i>Achlya hoferi</i>	Fins become frayed and provide the place for bacterial infection. The fungi penetrate into the muscle tissues.	Provide Bath treatment of potassium permanganate @ 100g/100-liter water for 10 minutes. Provide dip treatment with Copper Sulfate @ 100g/100liter water for 1minute.
Ichthyosporidiosis	<i>Ichthyosporidium hoferi</i>	The destruction of the epidermis in these points results in desquamation and the formation of tiny white colored necrotic areas, produced by the growth of the fungus.	Bath treatment in 3% salt solution is effective. Add copper sulfate @ 1-2ppm in fish pond. Add formation @ 15-25ppm in the pond. Bath the fish with 20ppm formalin up to 2-5 minutes.
Branchiomycosis	<i>Branchiomysis sanguinis</i> and <i>B. demigrans</i>	Necrotic patches on the gills, together with false membrane formation; made up of proliferation and adhesions of the gill epithelium.	Disinfect the tanks and ponds with quick lime or calcium cyanamide @ 2ppm, after complete drying the pond or tank. Treat the fish with 3% salt solution and add copper sulfate @ 1-2ppm in the fish pond.



### Other Parasitic Diseases

Disease	Causative agent	Symptoms	Treatment
Costiasis	<i>Costia necatrix</i>	Soft grayish-white film or sheet is observed on the surface of the fish body and the more intensely affected parts are reddened and hemorrhagic. Fishes scrape themselves against stones and other solid objects.	Infected fish should be removed from the tanks and ponds. Leeches should be destroyed, since these are vectors of the disease.
Whirling disease, Myxosporidiosis, Microsporidiosis, or lentosporidiosis	<i>Myxosoma cerebralis</i> , <i>Ceratomyxa shasta</i> and <i>Microsporidium</i> sp. <i>Myxosoma cartilaginis</i> , <i>Glugea hertwigi</i>	First symptom rotatory movements and black coloration in the caudal region of the body; moving on the surface of the water, the fish start this whirling movement when they swim.	Contaminated tanks must be disinfected with grease free calcium cyanamide @ 1 kg /m <sup>2</sup> . Apply slaked lime @ 80 Kg/ha in the pond before stocking the fish and use bleaching powder for pretreatment.
Chilodonellasis	<i>Chilodonella cyprini</i>	The skin of infected fish shows bluish-white opaqueness. Small pox like pimples appear in the neck region and near dorsal fins. Infected fish scrape their body against the bottom side of tank/pond and swim listlessly with improper respiration.	Methylene blue @ 3ppm and Acriflavine @ 10ppm were used successfully to control of this disease. Copper sulfates bath @ 8ppm for 15 mm are most effective method. Lysol @ 200 ppm bath treatment up to 30 seconds is also effective.
Dactylogyrosis	<i>Dactylogyrus vastator</i> , <i>D. Formosus</i>	The edges of gills turn grayish in colour. Initially these worms attack on gill filaments but when they are present in large numbers, they become distributed in all over the body.	Provide short bath in 40% formalin in 100-liter water for 30 minutes. Bath the fish in 3-4% salt solution for 2-3 minutes.
Gyrodactylosis	<i>Gyrodactylus elegans</i> , <i>G. medius</i>	These parasite attacks on skin causing inflamed and radish areas. Flashing in common symptom. In severe condition the	Formalin bath treatment @ 25ppm; NaCl salt solution bath treatment @ 2-5%



Disease	Causative agent	Symptoms	Treatment
		cornea of eyes become turbid due to blindness.	
Argulosis or fish louse	<i>Argulus foliaceus</i> , <i>A. pellucidus</i> and <i>A. coregoni</i>	These parasite attacks on skin causing inflamed and reddish areas. Secondary infection may be of bacterial hemorrhagic septicemia.	Provide short bath in 40% formalin in 100-liter water for 30 minutes. Bath the fish in 3-4% salt solution for 2-3 minutes. Apply cleaner @ 1-1.5 liter per hectare pond.
Lernaea (Anchorworm)	Anchor worms	Lernaea frequently attack almost all the species of major carps and sometimes cause large scale damage in nursery and rearing ponds.	Provide short bath in 40% formalin in 100-liter water for 30 minutes. Bath the fish in 3-4% salt solution for 2-3 minutes. Apply cleaner @ 1-1.5 liter per hectare pond.

