Fungal diseases of fish

Saprolegniasis

This is the term used to describe infection with fungi of the ***Saprolegnia parasitica*** and ***Saprolegnia diclina*** complex ***.*** Generally it results in surface infection but the pathogenesis is complex. Saprolegniasis is a fungal disease of fish and fish eggs most commonly caused by the *Saprolegnia* species called "water molds." They are common in fresh or brackish water. *Saprolegnia* can grow at temperatures ranging from 32° to 95°F but seem to prefer temperatures of 59° to 86°F. The disease will attack an existing injury on the fish and can spread to healthy tissue. Poor water quality (for example, water with low circulation, low dissolved oxygen, or high ammonia) and high organic loads, including the presence of dead eggs, are often associated with Saprolegnia infections.

Predisposing factors

Several factors are involved in the development of fungal infection in fish. These factors may be acting on the fish or the fungus and it's a combination of factors rather than any single condition which ultimately leads to infection. It has been long considered that the fungi responsible for the saprolegniasis are secondary pathogens, and lesions commonly seen after handling and after any traumatic damage to the skin, in overcrowded conditions and in conjunction with pollution or bacterial or viral conditions.Temperature has a significant effect on the development of the saprolrgnia infections. Most epizootics occur when temperature are low for that fish species.

Disease sings

Saprolegnia lesions are focal grey-white patches on the skin of the fish, which when examined under water, have a cotton wool-like appearance where the hyphal filaments extend out into the water. The early lesions are often almost circular and grow by radial extension around the periphery until lesions merge. The infection normally occurs via breeches in the epidermis or in the latter cases via the gut. Under a microscope, Saprolegnia appears like branching trees called hyphae. With progression of infection fish usually becomes lethargic and less responsive to external stimuli. So fish under such conditions is a target to predators.

There are no reports of infection of internal organs via the vascular route. Saprolegnia is also a common invader of incubating fish eggs. It usually establishes itself first on dead eggs and extends from there to neighbouring healthy ones.

Fig. 9.4 Spawning brown trout with *Saprolegnia* growth on the head and dorsum. The latter, especially, shows the characteristic whorling colonial growth of this fungus.

Management and Control

Fungal infections are difficult to treat and this one is no exception. Ideally,Saprolegniasis is best prevented by good management practices-

-such as good water quality and circulation, avoidance of crowding to minimize injury (especially during spawning), and good nutrition. Once *Saprolegnia*is identified in an aquatic system, sanitation should be evaluated and corrected. Common treatments include potassium permanganate, formalin, and povidone iodine solutions. Over treatment can further damage fish tissue, resulting in recurring infections. Environmental management is essential for satisfactory resolution of chronic problems. Bath treatment in NaCl (10-25g/lit for 10-20min), $KmNO_4$ (1g in 100lit of water for 30-90 min), $CuSO_4$ (5-10g in 100 lit water for 10- 30min).

Branchiomycosis

Branchiomycosis or "Gill Rot" is caused by the fungi *Branchiomyces sanguinis* (carps) and *Branchiomyces demigrans* (Pike and Tench) . Branchiomycosis is a pervasive problem in Europe, but has been only occasionally reported by U.S. fish farms. Both species of fungi are found in fish suffering from an environmental stress, such as low pH (5.8 to 6.5), low dissolved oxygen, or a high algal bloom. *Branchiomyces* sp. grow at temperatures between 57° and 95°F but grow best between 77° and 90°F. The main sources of infection are the fungal spores carried in the water and detritus on pond bottoms.

Disease Signs :- *Branchiomyces sanguinis* and *B. demigrans* infect the gill tissue of fish. Fish may appear lethargic and may be seen gulping air at the water surface (or piping). Gills appear striated or marbled with the pale areas representing infected and dying tissue. Gills should be examined under a microscope by a trained diagnostician for verification of the disease. Damaged gill tissue with fungal hyphae and spores will be present. As the tissue dies and falls off, the spores are

released into the water and transmitted to other fish. Histologically, hyperplasia, fusion of gill lamellae and area of massive necrosis, resulting from thrombosis of vessels by fungal hyphae, are seen togather within telangiectasis and vascular necrosis. Morbidity may reach upto 50%. High mortalities are often associated with this infection.

Management and Control

Avoidance is the best control for Branchiomycosis. Good management practices will create environmental conditions unacceptable for fungi growth. If the disease is present, do not transport the infected fish. Great care must be taken to prevent movement of the disease to non infected areas. Formalin and copper sulphate have been used to help stop mortalities; however, all tanks, raceways, and aquaria must be disinfected and dried. Ponds should be dried and treated with quicklime (calcium oxide). A long term bath in Acriflavine Neutral or Forma-Green for seven days helps this condition. Ponds should be dried and treated with quicklime (calcium oxide) and copper sulphate (2-3kg / ha). Dead fish should be buried.

Icthyophonus Disease

Icthyophonus disease is caused by the fungus, *Icthyophonus hoferi.*It grows in fresh and saltwater, in wild and cultured fish, but is restricted to cool temperatures (36° to 68°F). The disease is spread by fungal cysts which are released in the faeces and by cannibalism of infected fish.

Disease Signs

Because the primary route of transmission is through the ingestion of infective spores, fish with a mild to moderate infection will show no

external signs of the disease. In severe cases, the skin may have a "sandpaper texture" caused by infection under the skin and in muscle tissue. Some fish may show curvature of the spine. Internally, the organs may be swollen with white to grey-white sores.

Diseased fish shows curious swinging movements hence the disease is called as swinging disease. Along with liver, particularly severely affected organs are:- spleen(salmonids), heart (herring), kidney(salmonids), gonads,brain(salmonids), gills(salmonids), and musculature and nerve tissue behind the eyes(sea fish).

Management and Control

There is no cure for fish with *Icthyophonus hoferi;* they will carry the infection for life. Prevention is the only control. To avoid introduction of infective spores, never feed raw fish or raw fish products to cultured fish. Cooking helps destroy the infective life stage. If Icthyophonus disease is identified by a trained diagnostician, it is important to remove and destroy any fish with the disease. Complete disinfection of tanks, raceways, or aquaria is encouraged. Ponds with dirt or gravel bottoms need months of drying to totally eliminate the fungus.