



Cooperative Extension Service
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Fungal Diseases of Fish¹

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Fungi are a group of organisms called **heterotrophs** that require living or dead matter for growth and reproduction. Unlike plants, they are incapable of manufacturing their own nutrients by photosynthesis. Fungi are present everywhere--in saltwater or fresh water, in cool or warm temperatures. In most cases, fungi serve a valuable ecological function by processing dead organic debris. However, fungi can become a problem if fish are stressed by disease, by poor environmental conditions, receive poor nutrition, or are injured. If these factors weaken the fish or damage its tissue, fungus can infest the fish. Fungi can also prevent successful hatching when it invades fish eggs.

Fungi are grouped by the morphology of various life stages. All fungi produce spores--and it is these spores which readily spread disease. The fungal spore is like a seed which is resistant to heat, drying, disinfectants and the natural defense systems of fish. The three most common fungal diseases are discussed here. They are known as Saprolegniasis, Branchiomycosis, and Ichthyophonous disease.

SAPROLEGNIASIS

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. The presence of Columnaris bacteria or external parasites are also common with Saprolegniasis.

Disease Signs

Saprolegniasis is often first noticed by observing fluffy tufts of cotton-like material--colored white to shades of gray and brown--on skin, fins, gills, or eyes of fish or on fish eggs. These areas are scraped and mounted on a microscope slide for proper diagnosis. Under a microscope, *Saprolegnia* appears like branching trees called hyphae.

Management and Control

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. If mortality is in progress, medication is appropriate. Common treatments include potassium permanganate, formalin, and povidone iodine solutions. Overtreatment can further damage fish tissue, resulting in recurring infections. Environmental management is essential for satisfactory resolution of chronic problems.

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BRANCHIOMYCOSIS

Branchiomyces demigrans or "Gill Rot" is caused by the fungi *Branchiomyces sanguinis* and *Branchiomyces demigrans*. 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. 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 noninfected areas. Formalin and copper sulfate 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).

ICTHYOPHONUS DISEASE

Ichthyophonus disease is caused by the fungus, *Ichthyophonus 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 feces 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 gray-white sores.

Management and Control

There is no cure for fish with *Ichthyophonus 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 Ichthyophonus 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 are encouraged. Ponds with dirt or gravel bottoms need months of drying to totally eliminate the fungus.

SUMMARY

Fungal diseases are often indicative of a more serious problem. Saprolegniasis is a common fungal disease which affects the external surfaces of fish. It can be eliminated easily after the primary cause of illness has been identified and corrected. On the other hand, Branchiomycosis, a relatively new problem in the U.S., has caused high mortalities in cultured fish, and is difficult to control. Ichthyophonus disease is a systemic fungal disease and once it enters the fish, there is no cure. The best control for all fungal infections is good management: good water quality, good nutrition and proper handling.