AQUATIPS

Using hydrogen peroxide for Pacific threadfin infected by *Amyloodinium ocellatum*

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The Pacific threadfin (*Polydactylus sexfilis*), known as *moi* in Hawaii, is gaining popularity as an aquaculture product. The mild flavor of the fish appeals to a diverse market, making the fish desirable to culture. At the 1998 International Kapalua Wine and Food Symposium, threadfin was chosen the "number one fish" of the 12 fish tested for taste.

Farm-raised threadfin is ranked as one of the "best eating fish in the world," according to Howard Deese of the Hawaii State Department of Business, Economic Development and Tourism. Under the auspices of the USDA Center for Tropical and Subtropical Aquaculture project titled "Development of Threadfin and Milkfish Growout Technology," threadfin fry are produced by The Oceanic Institute and distributed to farmers throughout the state. Technical assistance in the culture of the distributed threadfin is provided through a collaborative effort with The Oceanic Institute, Anuenue Fisheries Research Center, and Sea Grant Extension Service. Initial results are encouraging: total net sales attributed to this collaborative effort to culture threadfin reached $508,500 by 1997.

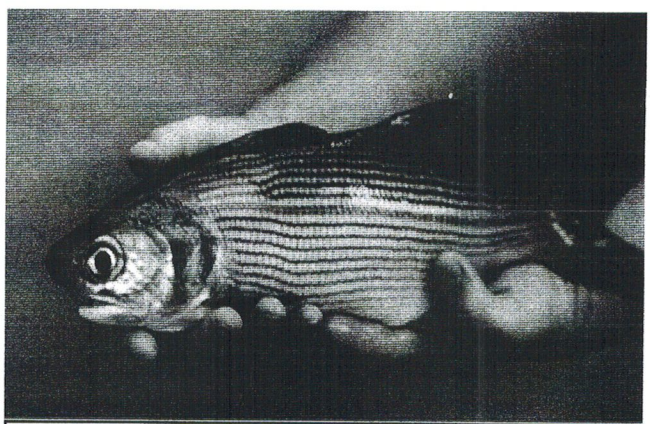

Figure 1. The Pacific threadfin is known as moi *in Hawaiian.*
-photo courtesy The Ocean Institute

Under suitable conditions, which include clean tanks with vigorous aeration and continuous rapid rate of water flow and proper diet, threadfin can be raised rather easily. When environmental conditions decline, threadfin become susceptible to infections of *Amyloodinium oceliatum*, more commonly referred to as *oodinium* (Figure 2), a parasite that can cause high mortalities. Some farmers have found this parasite a major obstacle to raising threadfin to market size. The primary infection site appears to be in the gills, although skin lesions have been reported in other species. Fish infected with this disease exhibit flashing (rubbing against the bottom or sides of the tank), loss of appetite and labored breathing.

Farmers raising threadfin need a treatment that is effective against *Amyloodinium* and at the same time safe for the fish. Two forms of chemical treatment commonly used to treat this parasite, formalin and copper, have not

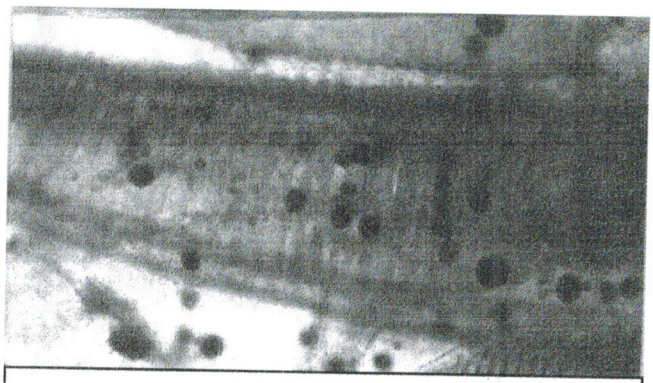

Figure 2. The dark spherical objects on this fish gill are Amyloodinium *sp.*
- photo courtesy Hawaii State Aquaculture Development Program

been very effective. In fact, threadfin appear to be very sensitive to copper and can die as a result of exposure to it. Both treatments would render the threadfin unsuitable for human consumption for some period of time. A third treatment involves dipping the threadfin in fresh water for several minutes. However, this treatment requires multiple applications to be effective and subjects the fish to the additional stresses of netting and physical handling.

Using fish suspected of infection at an aquaculture farm on the North Shore of Oahu, trials were run in May and November 1996 to test the effectiveness of hydrogen peroxide as a treatment for *Amyloodinium*. Thirty threadfin weighing from 21 to 300 grams were removed from growout raceways and placed into clean tanks filled with seawater at a temperature of 26° to 28°C. Prior to treatment, all fish were examined for the presence and level of *Amyloodinium* infection.

To confirm the presence of *Amyloodinium* infection a small section of gill tissue was clipped and then examined under a microscope. The level of infection was determined by counting the number of parasites on the gill sample. During these trials, 10 fish were placed in a clean tank with fresh sea water and exposed to a 75 or 150 parts-per-million (ppm) static hydrogen peroxide treatment. The remaining 20 fish served as controls and were placed in a tank that contained only freshwater. After 30 minutes, a rapid flow of sea water was turned on to quickly flush the tanks.

As seen in Table 1, the number of parasites decreased dramatically in the group exposed to hydrogen peroxide. The treated fish initially averaged 37 *Amyloodinium* per gill clipping, but after 24 hours, the

Table 1. *Amyloodinium* sp. count before and after hydrogen peroxide treatment.

Treatment	Pre-Treatment Mean # of Cells	Post-Treatment Mean # of Cells
Control (Range)	34.4 (1 - 143)	27.8 (1 - 186)
H_2O_2 (Range)	37.3 (3 - 85)	00.2 (1 - 1)

count was essentially zero. The few parasites that remained on the gills were shriveled and appeared to be lifeless. In comparison, the control group initially averaged 34 *Amyloodinium* per gill clipping and after 24 hours, the number had decreased to an average of 28.

The slight reduction in the number of parasites in the untreated fish was not that surprising. It has been reportedly observed that when threadfin infected with this parasite are placed into clean sea water, the infection rate naturally declines to some extent.

The effectiveness of hydrogen peroxide suggests that this may be a practical treatment for *Amyloodinium* infections in threadfin. For use with other species, it would be prudent to test a small batch of fish for any potential negative reaction to this chemical prior to treating the general population. Various species of fish react differently to hydrogen peroxide. Certain species tolerate the chemical with no adverse side-effects, while others are very sensitive to it. The same applies to the different life stages; a juvenile may react differently than an adult to a 100 ppm hydrogen peroxide treatment. It is also important to measure the water temperature when treating with hydrogen peroxide as the warmer the water, the more toxic the treatment.

Studies are continuing in an effort to persuade the FDA to approve hydrogen peroxide for the treatment of *Amyloodinium* and other diseases encountered in the commercial production of fish. While it does appear to be an effective tool in removing this parasite, the best approach will always be prevention.

Note: The Food and Drug Administration has not yet approved hydrogen peroxide as a treatment for any fish disease other than fungal infections. The preceding work is part of an ongoing effort to obtain approval of the use of hydrogen peroxide for other disease issues in aquaculture. Hydrogen peroxide is considered safe for humans. However, those using concentrations of 35 percent and higher should wear protective clothing and safety glasses at all times.