

Southeast Asian Fisheries Development Center

Aquaculture Department

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Aqua Farm News

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Seaweed diseases

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Item TWO

Seaweed Diseases

Three general categories of disease affecting *Porphyra*, the most extensively cultured seaweed in Japan, have been identified:

(i) Those caused by primary pathogens which attack *Porphyra* even when culture conditions are reasonably adequate, viz, red rot caused by *Pythium porphyrae* and chytrid blight caused by an unidentified phycomycete.

(ii) Those caused by facultative pathogens which attack weakened or stressed plants under poor culture conditions such as poor water quality, crowding, or abnormal water temperatures, viz, white rot which is of bacterial origin and green spot caused by bacteria like *Pseudomonas*, *Vibrio*, *Beneckea*, and Agar-bacterium.

(iii) Those caused by nutritional, genetic, or stress-related factors, viz, bud blight, white blight, and shot hole, which are believed to be induced by poor nutrition or water quality; poor quality product and cutting and washing blight which are thought to be caused by genetic or other plant characteristics; and tumors and diatom felt which seem to be induced by severe environmental stress.

Undaria culture, which has grown very rapidly in Japan from almost zero production in 1960 to over 100,000 tons in 1980, is also affected by diseases such as:

(i) Shot hole which is caused by bacteria of the genera *Vibrio*, *Alteromonas*, *Pseudomonas*, *Flavobacterium*, and *Moraxella*, and by the parasitic brown alga *Streblonema* and the copepod *Thalassira* sp.;

(ii) Chytrid blight which is caused by parasitic fungi.

Laminaria is also cultured in Japan for food but there has been no report of diseases so far, except for the occasional occurrence of parasites like *Hydrozoa* and *Polyzoa* which grow densely on the blades and cause low market prices.

Gelidium is the most important species for agar production in Japan. No diseases have been reported.

In the other countries in the region, there is limited occurrence of seaweed disease, perhaps because of the relatively recent introduction and development of seaweed culture compared to finfish and crustacean culture.

In India, the culture of seaweeds, mostly *Gracilaria*, is still at the experimental stage and no disease-related problems have been reported, except for sedimentation and grazing by fish. The expansion of the seaweed industry in India is constrained by scarcity of suitable areas as a result of pollution and limited transfer of technology for industrial use of seaweeds.

In Indonesia, a recent outbreak of "ice-ice" disease in *Euclima* has been reported.

In the Philippines, "ice-ice" disease has been reported in *Euclima* but the cause of the disease has yet to be established. A research study at the SEAFDEC Aquaculture Department identified the "rotten thallus syndrome" in *Gracilaria* cultured in tanks as caused by agar-digesting bacteria.

In Thailand, *Gracilaria* culture in ponds or net cages is done on an experimental basis and no diseases have been reported.

In China, the main species grown (i.e., *Laminaria*, *Porphyra*, *Euclima*, and *Gracilaria*) are affected by diseases classified either as environmentally induced (e.g., very strong illumination, sudden fluctuations of turbidity or salinity, and nutritional deficiency) or caused by pathogens (i.e., bacteria, fungi, etc.). In China, the diseases of *Laminaria* include green rot disease, white rot disease, blister disease, twisted-blade disease, malformation disease, sporeling detachment

disease, and swollen stipe-twisted frond disease. *Porphyra* is affected by the following diseases which are encountered during artificial seedling production and grow-out phases: filemot spot disease, red-rot disease, white-ring disease, shark skin-like disease, and white-rot disease. *Eucheuma* has been afflicted by "ice-ice" disease which seems to be preceded by poor nutrition and low phosphate concentration. *Gracilaria* in ponds is reported to be affected by epiphytic infestations (e.g., *Enteromorpha*, *Chaetomorpha*, *Ectocarpus*, and *Polysiphonia*).

In the Republic of Korea, the two principal cultured seaweeds - *Porphyra* and *Undaria* - are affected by fungal and bacterial infections as well as by environmental conditions like high temperature and low nutrient levels and by the overcrowding of installations.

Source: *Seaweed Health Management* by Jun-ichi Tsukidate, Chen Jia Xin, Yong Gun Gong in **Fish Health Management in Asia Pacific**, ADB/NACA, ADB Agriculture Department Report Series No. 1, June 1991.

Item Three

Environmental Impact of Seaweed Culture

Seaweed culture has expanded rapidly over the past few years. In 1987, the Food and Agriculture Organization of the United Nations estimated 3,139,473 tons (wet weight) of seaweed to have been produced throughout the world with the bulk from Eastern Asia. This expansion has brought benefits in terms of income, employment, and foreign exchange, but has also been accompanied by some conflicts with other users of the coastal zone and concerns over potential environmental impact.

Physical aspects

Site preparation of some species involves removal of rocks and other obstructions and potentially competitive grasses or predators. Such operations could result in some damage to coastal ecosystems, and in some instances the loss of species of conservation interest, such as seagrasses. The routine management of seaweed farms in shallow waters, such as *Gracilaria* or *Eucheuma* farms, can result in additional damage through trampling and accidental damage.

There is also some potential for large scale farms, such as the large areas covered by *Laminaria japonica* culture in China, to influence coastal water movement. There is the possibility of enhanced sedimentation, but seaweed farms can also protect coastal areas from erosion. Large seaweed farms may also help protect other more sensitive culture species and systems. For example, *Laminaria japonica* culture zones (in China) are used to shelter areas where more fragile and sensitive culture species and systems, such as mussel or scallop culture, are located. Introduction of seaweed culture rafts, ropes, anchors, and other structures can increase the surface area of substrate which particularly in open waters, may enhance production of other marine organisms in otherwise barren areas in the same way that artificial reefs have been shown to do. Seaweed culture may also be used very effectively to rehabilitate degraded coastal areas and enhance production from otherwise unproductive and barren environments.

Aesthetic aspects and multiuser conflicts

The potential aesthetic impact of aquaculture has dominated arguments over aquaculture development in some countries and aquaculture planners have to ensure that potential aesthetic