

STATUS AND PROBLEMS OF MARINE FISH SEED PRODUCTION IN THAILAND

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Aquaculture of marine fishes such as sea bass, milkfish, and mullet among others, have been conducted in Thailand for a long time in its provinces along the coast. The fry of these fishes have been collected from natural waters and cultured for the consumption of the family. The traditional method was used in rearing these fishes - flowing seawater into earthen ponds using the bamboo stake trap as the water gate, and culturing trapped fry. Feed was usually the juveniles of other species that come with the water. Needless to say, production was very low.

Rearing marine fish in commercial scale is fairly recent, only in the last 30 years. Seed collection, transport, nursery, grow-out culture, and rearing techniques have been experimented by the Department of Fisheries since 1954 at its Prachuab Fisheries Station. The results were then disseminated to fish farmers. The species which are popularly cultured include sea bass (*Lates calcarifer*), red snapper (*Lutjanus argentimaculatus*), and grouper (*Epinephelus tauvina*).

Status of seed production

Sea bass (*Lates calcarifer*). Culture of sea bass has been initiated in Thailand for a long time by collecting the fry from natural waters particularly in the mouths of rivers, canals, and swamp/mangrove areas. However, sea bass culture at that time could not reach the commercial scale because of the uncertain quantity of fry available. In 1973, the Department of Fisheries succeeded in breeding sea bass, and since then, sea bass culture rapidly advanced. Breeding of sea bass can be conducted in three ways:

Artificial breeding

Normally, artificial breeding can be done during April to September by collecting live broodstock caught by fishermen. Stage of maturity of spawners are determined and the potential spawner with ripe eggs and milt are selected for stripping. Fertilized eggs are transported to the hatchery. This method is no longer popular because spawners can be taken from grow-out ponds or cages.

Natural breeding in the tank

By culturing sea bass fry for three years, 50-cm fish weighing 2.5-3 kg can be obtained and used as spawners. Breeding procedure begins with selection

of the healthy broodstock to rear in the spawning tank. Good management of the broodstock is necessary. For example, good water quality should be maintained and food should be fresh and given at 1-2% of body weight. Normally, sea bass spawns between 7-11 p.m. of the first to the fifth day of the full moon and dark moon. About 400,000-800,000 eggs are obtained in each spawning. Fertilized eggs are collected the next morning using scoop nets of fine mesh size, and transferred to another tank to hatch. Rearing is done also in this tank. This method seems to be the most successful that the Department of Fisheries has extended to the private sector.

Induced spawning by hormone injection

The procedure of spawning is the same as the second method except that selection of broodstock to be injected to induce spawning is made. After that, the broodstock is placed in the spawning tank, following the procedure in the second method. Many types of hormone have been used, for instance, HCG (human chorionic gonadotropin), puberogen, and pituitary gland.

Nursery of sea bass fry can be divided into two phases:

Larval rearing

The water quality in the rearing tank needs special attention. Clean water (25-30 ppt) should be replaced after the wastes have been siphoned. The rate of water replacement depends on the feeding period of each stage. During rotifer feeding, only 10-20% of the water has to be changed to prevent loss of rotifers. During *Artemia* and minced fish feeding, 50 and 100% change are needed, respectively. Feeding should be constantly checked; adequate amount of suitable food must be fed to the larvae at each stage. After rearing to day 15-18 when the difference in size of larvae can be distinguished, grading should be done every 3-5 days to prevent cannibalism. Larvae can be harvested when they are 30-45 days old (1-1.5 cm). Generally, the price of this size is 2 Baht/pc.

Nursing of fry

Before transferring sea bass fry to ponds, the fry have to be nursed first until they reach 6-8 cm. This ensures better fry survival. Nylon cage (2 x 1 x 0.9 m; 0.1 mesh size) is generally used; stocking rate is 300-500 ind/cage. The fish are adequately fed finely chopped fresh fish or trash fish 2-3 times a day. To prevent disease infection, antibiotics such as tetracyclin and oxytetracyclin are mixed with the food and fed to fish every three days. Grading of fish is done every 7-10 days. The fry reaches fingerling size within 40-60 days and can now be stocked in ponds.

Grouper (Epinephelus tauvina). Grouper cage culture has been initiated at the Songkhla Brackishwater Fisheries Station in 1975. Fry are collected from shallow water areas, mouths of rivers, and canals. Tree branches bound together are used to aggregate 2-3 cm fish. For 100-300 g fish, traps are used. Grouper fry were found distributed in the coastal areas of Pethburi to Narathiwat Province of the Gulf of Thailand and throughout the Andaman Coast.

At present, grouper is one of the most important fish cultured in cages because of its fast growth and high survival rate. The price of fish is also high.

Consequently, the area used for cage culture has been expanded especially along the Andaman Coast. Moreover, collection of grouper fry from the wild has become a minor occupation. Fry (1-2 cm) are generally sold for 1-2 Baht/pc while bigger fish (100-300 g) are sold for 30-50 Baht/pc. Market-sized grouper is expensive: 500-530 Baht/fish for 1.2-2.0 kg fish and 380-400 Baht/kg for fish outside the above size range. But the expansion in culture is not without consequences. Grouper fry catch in the wild has reportedly declined rapidly.

Breeding of grouper was first tried in 1984 at the Phuket Brackishwater Fisheries Station. Since then, attempts to improve breeding technique has been intensified to obtain sufficient seed for grow-out culture. But up to the present, the results are largely experimental.

Red snapper (*Lutjanus argentimaculatus*). Red snapper is another highly valued fish. It can be cultured in brackishwater areas. Red snapper is also carnivorous like sea bass and grouper and is priced much higher than the former. As a result, many farmers have shifted to its culture. As with grouper, red snapper fry are collected from the wild and cultured in cages.

In the last ten years, breeding of red snapper has been carried out by the Rayong Marine Fisheries Station mainly to stock depleted fishing areas. The increasing demand of red snapper fry for culture is contributing to the decline of the natural stock. The Department of Fisheries has to improve the breeding technique of this fish to get a production adequate enough to supply the fish farmers and reduce dependence on natural sources.

The method of nursing red snapper fry is the same as that of sea bass and grouper. In Phangnga Marine Fisheries Station where experiments on cage culture in tin mining ponds were conducted, it was recorded that red snapper attains 299.2 to 1,125 g in 7 months. Feed conversion ratio is 4.5:1 and survival rate is 89%. Commercial culture is fairly recent and information on grow-out culture is seldom recorded.

Problems in marine fish culture

Marine fish culture in Thailand encounters problems similar to those of other countries:

Rearing ground. Cage culture has spread out to coastal areas, causing obstruction in navigation. Accidents have been reported. Furthermore, fishfarmers operate cage culture facilities along rivers, canals, bays, or coastal areas which authorities find difficult to control. To solve this problem, the Department of Fisheries began requiring permits to operate cages. The Department aims to closely monitor the areas where cages are present.

Shortage of feeds or seasonal supply of feeds. Trash fish is the most important raw material used in feed formulations. It is also utilized by the fish meal industry, canning industry, and animal feed industry, among others. Price of trash fish is, therefore, high, especially when catch is low. It is expected that the future trash fish supply will no longer be enough. In anticipation of this problem, it is recommended that collaboration between the government and the private sector to produce artificial feeds be carried out.

Water pollution. With the progress of the industrial sector, the expansion of communities along the shoreline, and the use of chemicals and new technology in agriculture, pollution of soil, water, and air has magnified. Water pollution has caused fish losses in farms in addition to those in natural bodies of water. It is recommended that concerned agencies strictly enforce anti-pollution regulations.

Shortage of capital. Capital for materials and equipment essential for cage culture is quite high, especially seeds and feeds. As such, small-scale fishermen have difficulty in sourcing funds. To solve this problem, financial institutions are urged to help fishfarmers by providing soft loans or other easy-term financial arrangements.

Discussion

The technical issues discussed by the workshop participants include:

Shrimp

- Stocking density, size of tank/tank system, feeding, and survival of larvae
- Prophylactic measures for broodstock and eggs
- Problems in nursery operations (i.e., quality of fry, facilities)
- Criteria for fry quality
- Seasonality of broodstock and fry supply
- Pricing of older larvae

Marine fish

- Milkfish spawning and subsequent appearance of fry in shores
- Advances in snapper and grouper spawning
- Species of grouper in Malaysia
- Use of *Artemia* as feed
- Anaesthetic used for milkfish
- Use of raceways for sea bass
- Fishing gears for wild fry collection
- Production of grouper in Thailand

The participants noted the following training gaps:

Shrimp

- Lack of experienced technicians especially for newly started hatcheries in Malaysia and Thailand. Areas for intensive training include eyestalk ablation, production of *Artemia*, and chemical (antibiotic) treatments.
- Thailand's representative cited frequent "piracy," e.g., high staff turnover due to more attractive offers from privately owned hatcheries.

Marine fish

- Inadequate knowledge of milkfish hatchery technicians (NBBP) as cited by the representative from the Philippines. Some NBBP sites do not have technical staff to maintain the project.
- Because hatchery of marine fishes is new in Malaysia, it does not have skilled technicians in seabass hatchery although the industry is growing.