The milkfish hatchery

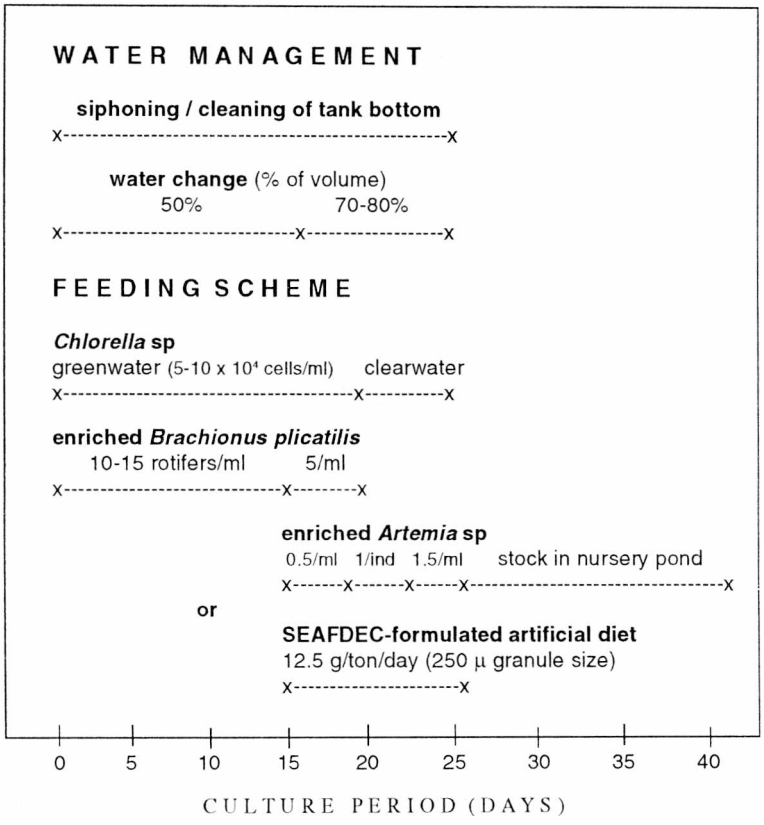
By **M Castaños**

Yes, it is quite profitable for hatchery owners to convert their tiger shrimp hatchery to milkfish hatchery.

A newly released report* from SEAFDEC/AQD assessed the economic viability of 4 commercial milkfish hatcheries operating in 1992. AQD researcher Dr. Luis Ma. Garcia notes that hatchery owners can get a 54-61% return-on-investment and about 1.5 years payback period from operating either a large- or small-scale hatchery. The hatchery is operated using the technology developed by AQD in the '80s.

The conditions of profitability are as follows:

- the eggs or newly-hatched larvae are acquired at ₱6,000 per million at most**
- the selling price of fry is ₱0.50 each, if not more



Water management and feeding scheme for rearing milkfish
(modified from RSJ Gapasin, R Bombeo, P Lavens, P Sorgeloos, H Nelis. 1998. Aquaculture 162: 269-286)

The 4 hatcheries that AQD assessed have total tank capacity of 145 to 325 tons, with capital outlay of over ₱128,000 (small-scale) or ₱833,000 (large-scale). The capital outlay, Dr. Garcia says, is used for facilities and equipment needed for milkfish operation like additional larval food tanks. The working capital (for two runs) amounts to about ₱42,000 (small) or ₱123,000 (large).

In terms of production, the hatcheries produced half a million to nearly 4 million fry from 3-6 operations conducted from April to October. Larval survival ranged from 15 to 42% after 21-24 days. Earnings from the hatchery were nearly ₱200,000 to over ₱1 million.

"Hatchery operators can earn more than double the selling price of its produce by rearing 21-day old fry for an additional two weeks in nursery ponds," suggests Dr. Garcia. "The operational expenses of rearing fry in nursery ponds are minimal, because fry thrive on naturally grown food organisms."

More recently, two more hatchery owners attest to the profitability of milkfish hatchery using AQD technology. Luis Rojas of TRC hatchery (Batan, Aklan) and Salvador Gestosani of Sto. Niño hatchery (Guimbal, Iloilo) made runs starting 1996. But the hatcheries encountered low acceptance of hatchery fry by fishpond owners due to the perceived low growth and high

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*Garcia LMB, RF Agbayani, MN Duray, GV Hilomen-Garcia, AC Emata, and CL Marte. 1999. Journal of Applied Ichthyology 15: 70-74. For copies of this report, email <library@aqd.seafdec.org.ph> or contact Dr. Luis Ma. Garcia <wgarcia@aqd.seafdec.org.ph>

**Presently, only SEAFDEC / AQD sells, if not gives out for free, milkfish eggs or newly hatched larvae to private hatcheries under its *Accelerated Transfer of Milkfish Hatchery Technology Program*. For inquiries about this program, contact <aqdchief@aqd.seafdec.org.ph>. However, there are private milkfish pond owners currently raising milkfish broodstock in ponds or tanks who may sell eggs or hatchlings. (One company said it imported 2,500 spawners from Taiwan, and has in stock 13,000 breeders of varying ages out of locally sourced fry. However, only 5,000 of these are described as "productive.") It is best to contact the nearest DA-BFAR office because some of these broodstocks were "privatized" stocks of the now-defunct National Bangus Breeding Program (NBBP).

If you're interested to go into the milkfish broodstock business, AQD can provide technical assistance. AQD has a working technology for broodstock management, handling and transport; and as well as the all-important feeding management scheme.

AQD has also a demonstration complex for its fish breeding-hatchery technologies. To arrange visits, contact: <training@aqd.seafdec.org.ph>

Training series for fry gatherers

Milkfish fry gatherer. *Milkfish fry gatherers of southern Iloilo's coastal towns are currently training at AQD on the identification, catching, and handling of fish fry other than milkfish. Fry of seabass, siganid, grouper, spotted scat or 'kikiro', mullet, among other species are often thrown away because gatherers do not know their aquaculture potential*

SEAFDEC/AQD is conducting a series of lectures and training among fry gatherers in five southern Iloilo towns about the status of the milkfish fry fishery, the effect of the fry fishery on other fishery resources, and the use of milkfish and some larval by-catch in aquaculture.

These fry gatherers are among the many stakeholders being trained for empowerment under the Panay Gulf Development Program (PGDP) of Congresswoman Ninfa Garin of Iloilo's First District. The project aims for both economic development in coastal towns and the conservation of coastal marine resources in Panay Gulf.

These fry gatherers operate the 'fry sweeper', 'sagyap', 'tangab' and other gear to collect milkfish fry, which have an established market. Unfortunately, during fry gathering, untold thousands of larvae and juveniles of hundreds of other species of fish (the larval by-catch) are killed incidentally, or more often, intentionally dumped on the beach to avoid repeated catching and sorting in the fry gears.

An AQD trainor emphasized that it is bad practice for milkfish fry gatherers to dump the larval by-catch because these larvae would otherwise grow to be the bigger fish caught by the municipal and commercial fisheries. All the fry gatherers were also fishermen (and some women), and they easily understood that in order for them to have big fish to catch, they must return to sea the larval by-catch from milkfish fry gathering.

The fry gatherers do recognize some of the other species of fish larvae and juveniles, but they had to be taught that snappers, groupers, seabass, rabbitfish, mullets, and scats have a potential market as seed for aquaculture. The PGDP also plans to use some of the freshwater-tolerant larval by-catch to seed upland and inland water bodies.

The lectures and discussions were conducted in the dialect, with plenty of visual aids. The first three batches of fry gatherers (total about 100) came from San Joaquin, and several more batches from Miagao, Guimbal, Tigbauan, and Iloilo will take their turn in the next few months. - By TU Bagarinao

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incidence of deformity in market-sized milkfish. However, with the sporadic scarcity of fry from the wild, pond owners may no longer have a choice (see related story).

Nine other hatcheries are currently cooperating with AQD in testing its hatchery technology.

AQD's hatchery technology

Operating a milkfish hatchery is not much different from operating a tiger shrimp hatchery. The hatchery operator still needs to maintain good water quality and give

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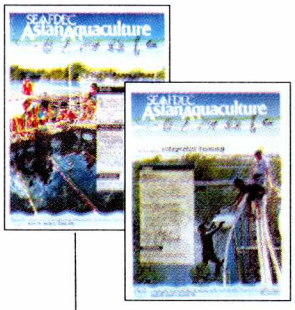
Features on milkfish

We previously run a series on the milkfish industry that appeared in five issues of this newsletter, *SEAFDEC Asian Aquaculture*. The articles are on:



Prospects of milkfish sea cage farming
Industry situationer: milkfish farming in marine pens / cages
Ecological limits of high-density milkfish systems
Economic value of the milkfish industry
Fry supply from the wild
Broodstock development in the Philippines
Milkfish ponds from mangroves

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the right type of food to the milkfish at the right time and quantity. Larval rearing operations are presented in a chart that a hatchery operator follows, and where the water management, feeding scheme, and other critical procedures are indicated.

The chart on page 14 is AQD's new and improved method of rearing milkfish larvae. It also reflects the actual practice of hatchery operators.

"We are able to improve the nutrition of the larvae by using vitamin C and what we call HUFA or highly unsaturated fatty acids," explains AQD researcher Rolando Gapasin. "Vitamin C works the same in humans as in fishes. It strengthens the bones, reducing the incidence of scoliosis, distorted or twisted gill filaments, and short operculae and snout. Fatty acids are essential, too. What we are sure of is that, without fatty acids, fish larvae grow poorly, feeding is not very efficient, larvae develop anemia and there is high mortality."

So, in the chart, hatchery owners provide not just rotifers and *Artemia* but **enriched** rotifers and *Artemia*. Enrichment is done by feeding these rotifers and *Artemia* HUFA booster diets supplemented with Vitamin C (commercially available) before these are given as feed to milkfish larvae. Enrichment may also be done by feeding rotifers/*Artemia* with microalgae with high HUFA content.

Better growth is the obvious result, but so is lesser incidence of deformed operculum where the gills are exposed.

The rate of fry deformity does **not** seem to have a large impact in nursery and grow-out ponds. The DA-BFAR station in Pagbilao, Quezon which made an independent study comparing wild and hatchery fry in nursery pond (~10 weeks) reported that only 3% of hatchery fry can be considered "abnormal," but growth rates are about the same. On the other hand, an AQD cooperator in Negros reported a mere 0.23% deformity after about 9 weeks in nursery pond. Newly hatched larvae were sourced from AQD's Tigbauan Station, Iloilo so transport stress may help account for the difference in survival.

In actual grow-out culture, deformity can hardly be seen in harvest-sized milkfish. AQD cooperators reported 0.003 to 0.05% aesthetically, visually unappealing fish in their commercial runs using hatchery fry. Wild and hatchery fry probably taste the same.

AQD remains cognizant of the industry's apprehensions regarding hatchery produce. Thus, researchers continue in their efforts to refine the milkfish hatchery technology.

SEAFDEC/AQD's research milestones for the milkfish *Chanos chanos*

YEAR	RESEARCH ACCOMPLISHMENT
	Broodstock technology
1976	first induced spawning of adults from the wild
1980	maturation and natural spawning of captive broodstock in floating sea cages
1981	start of the National Bangus Breeding Program (NBBP) to raise broodstocks in floating sea cages at 12 sites in the Philippines
1983	completion of the milkfish life cycle in captivity
1984	extension manual on broodstock and spawning
1986	maturation and natural spawning at four NBBP sites
1987	efficient egg collector developed for sea cages
1990	natural spawning of broodstock in concrete tanks
1995	privatization of NBBP broodstocks
1997	formulation of an effective broodstock diet
	Hatchery technology
1976	first induced spawning of adults from the wild
1978	successful larval rearing in the hatchery
1982	extension manual on spawning and larval rearing
1983	mass production of fry in the hatchery with eggs coming from natural spawning of captive adults
1984	start of regular training courses in milkfish hatchery
1991	refinement and verification of hatchery techniques
1991	mass production of fry in a private commercial hatchery
1992	technology transferred to more private hatcheries
1995	formulation of effective diet for larvae in the hatchery

AQD milkfish technology is supported by more than two decades of research