

# Promising marine species for hatchery

By the **SAA Staff**

In addition to the more established marine-cultured species like milkfish, which has an integrated broodstock and hatchery system well-studied and adopted, commodities like seabass, snapper, and grouper are slowly coming into their own. With research and development institutions like SEAFDEC/AQD constantly doing studies on broodstock and hatchery systems, it's just a matter of time and some fine-tuning to get their technologies verified and extended to the eager aquaculturist.

Meanwhile, we focus our attention on less familiar species. We try to examine the merits and viability of their hatchery technology.

For mudcrab hatchery, we went to Catbalogan in Samar and pearl oysters to Palawan. Finally, for abalone and corals, we went to Cebu and its neighboring islands to report on their current hatchery status.

The following are the field reports of our SAA staff.

## Abalone hatchery in Guiuan, Samar

The Department of Agriculture-Bureau of Fisheries and Aquatic Resources Research Outreach Station for Fisheries Development is an office that maintains a multi-species marine hatchery for stock enhancement in the municipalities of Eastern Samar. In collaboration with this office, the Guiuan Marine Development of the Guiuan Development Foundation partly funds the project.

Among the species for stock enhancement are the giant clam, abalone and lobster.

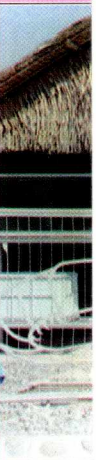
The abalone hatchery started operating in September 2000 with 30-35 broodstock. Spawning was done the following month (November) but survival was less than 1%. Spawned eggs were siphoned to basins with seawater for 12 hours. Until such time, they were stocked in settlement tanks (1 ton) with settlement substrates with settled diatoms in filtered seawater. Juveniles (2-3 mm shell length) were fed the seaweed locally called "culot" (*Laurencia*).



*Mr. Jaime Salazar of DA-BFAR is optimistic about his abalone hatchery which follows SEAFDEC methods*

## Oddities and facilities for other species at NCAMFRD

*L-R: Animal cemetery -- beached whales, dead dolphins and other endangered aquatic animals are buried here; silver perch hatchery; freshwater prawn hatchery; Caranx ignobilis, locally known as talakitok, maliputo or mamsa; and catfish hatchery*



The seaweed is available during the northeast monsoon April - October ("amihan").

Problems in the hatchery as identified by Jaime Salazar, the center's head, are the unavailability of seaweeds during off-season, mortality, irregular spawning (first spawning in November was followed in December, then late March), and settlement plates get overgrown with filamentous algae. Mr. Salazar says that the seaweeds from the wild carry with it small crabs that feed on the larvae. Handling methods have yet to be perfected.

## Mudcrab and other species at WESAMAR

WESAMAR<sup>4</sup> is a Philippine government project funded by the European Union and implemented by the Department of Agriculture until the year 2000. By May 2000, a gap phase of transition was consolidated following EU's commitment of support for two years to sustain the strategies and operations of the project. Under this scenario, support was directed at strengthening the institutional capacity of the WESAMAR Federation of Cooperatives to manage the assets and projects that were turned over to it by WESAMAR.

One of many projects of WESAMAR is the multi-species hatchery in Burabod, Villareal, Western Samar. Today, it is under the supervision of Western Samar People's Aquamarine Ventures Corporation (WESAMARINE) since it was turned over in May 2000. Since its inauguration, the multi-species hatchery equip-

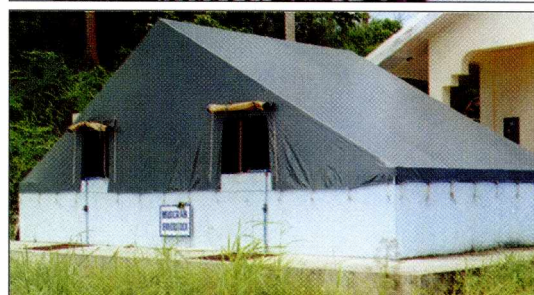
ment has been commissioned, and production has been initiated.

Four cycles of mudcrab production have been initiated. The first sales involved 1,200 45-day old crablets sold at P20 each. The next batch yielded 7,000 crablets and sold at the same price. Steady production has been achieved at 10,000 crablets per week.

➡ NEXT PAGE



*Mudcrab  
spawner and  
broodstock  
tanks*



<sup>4</sup> Western Samar Agricultural Research Development Program





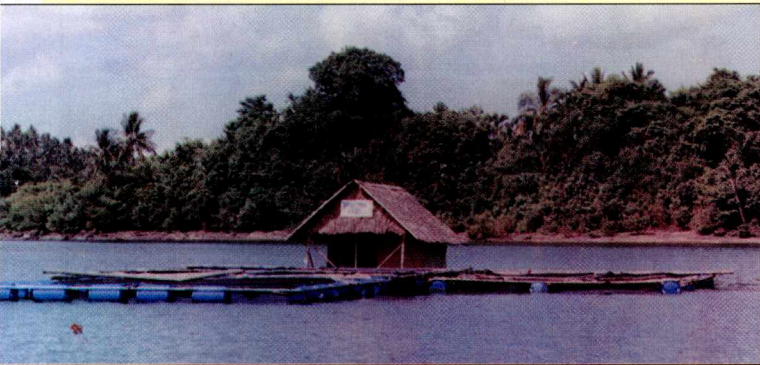
Tanks for culture of algae (above), and WESAMARINE president Ernie Ridaja (right)



Lobster culture



Broodstock cages for lobster in Guian, Samar (right) and for grouper at WESAMAR (left)



Broodstock come from Catbalogan, Samar. Mudcrab producers' ponds are now assured of a steady supply of crablets.

Operation of the mudcrab hatchery follows the SEAFDEC/AQD method. Technical assistance was provided by AQD.

Mud crab broodstock are obtained from Catbalogan and Tacloban and held in 2 units of 5-ton tanks. Following the spawning, the crabs are removed from the tank and maintained individually in 500-liter tanks. Spawned eggs are attached to the abdominal flaps until hatching. Newly hatched zoeae are collected and placed in 10-ton rearing tanks. The zoeae are fed *Brachionus* and *Artemia* while crablets are fed finely chopped mussel. *Chlorella* or *Tetraselmis* are added in the rearing tank as food for the *Brachionus* and for water conditioning.

WESAMARINE's grouper hatchery was first used for mud crab, but it was plagued with problems. Broodstock are now placed in floating cages and concrete tanks and scheduled to spawn within the next months. Broodstock are now placed in floating cages and scheduled to spawn within the next months.

The multi-species hatchery is a project that intends to address the declining stock of mudcrab and grouper, two marine resources that have been declining due to unregulated and intensive gathering. It is part of a bigger mariculture development program covering culture technology, feed, and marketing of groupers, siganids, tilapia, and mudcrab. Eventually, the multi-species hatchery production would include shrimp.

## Pearl Oysters in Busuanga, Palawan

People from Southern Marine Corporation (SOMMACO) and Hikari South Sea Pearl Corporation in the Calamian group of islands in Busuanga, Palawan sum up the hatchery technology for pearl oysters in the Philippines as still in the experimental stage. Different factors pose a limitation to the large-scale production of pearl oyster larvae.

Hikari resident manager Agustin Badon said that in general, only 70% of the hatchery aspect of pearl farming is established. The remaining 30% is "an art."

"It is not like the tiger shrimp industry where everything is already in place, so we know what problems to expect and the proper adjustments to make. In the pearl oyster hatchery, we cannot say which technique is effective and which is not. We simply look for solutions each time we encounter problems. If we can establish definite hatchery techniques for pearl oysters, we can produce five to six times a year." Presently, they are able to produce twice a year.

SOMMACO consultant Malou Sanchez on the other hand said that they have seen some improvements in the years they have spent in the culture of pearl oysters. Survival rate has increased to 90% and they have been able to improve the quality of the shells they produce.

“There are only about seven of us (corporations involved in pearl farming) here, so we are willing to share whatever resources we have. But the intricate process and the cost of technology involved allow us to produce pearl oyster larvae mainly for our own use.”

Ms. Sanchez called the hatchery stage as 0-40 — that is, the first 40 days in the life of a pearl oyster.

Spawning is done with the selection of male and female parent stock, from which eggs are produced. This occurs during day 0. Eggs are at the “d” stage during day 1 (as they take the form of the letter “d”) after which they metamorphose into the larval stage for five to six days until they reach the early umbo stage. Full umbo stage is at day 15. They grow into the pediveliger stage at days 16 to 21, and later develop into the spat stage as they begin to crawl and attach themselves to substrates. Culturists wait for the microscopic larvae to reach a shape or size that can already be seen by the naked eye. At day 40, they are ready for deployment in long lines out at sea.

Feed for the larvae during the hatchery stage consist of unialgal cells which SOMMACO buys either from SEAFDEC/AQD or abroad. There are unialgal cells in Philippine waters and but there is not enough people with the capability to do the isolation which itself takes a long process.

“We are in business more than in research so we do not have much time to do the isolation. But in the future, we expect to use solely local resources for our nutritional requirements,” she said.

She also said that they aim to come up with higher survival and very good genetic stock at the least cost of production.

SOMMACO has a building facility that facilitates an efficient flow of work inside. It requires the least number of people and the least number of movements. The water pump and filter systems are juxtaposed with the algal production facility where natural food is grown. Next to it is the larval rearing area which then flows into the nursery where the larvae are prepared for deployment.

John Hamiter, another consultant for SOMMACO, said that with this design, they have no need to go out of the building at all, especially during typhoons.

On the other hand, Hikari hatchery technician Redentor Diaz said that there are important factors to consider in the larvae culture of pearl oysters.

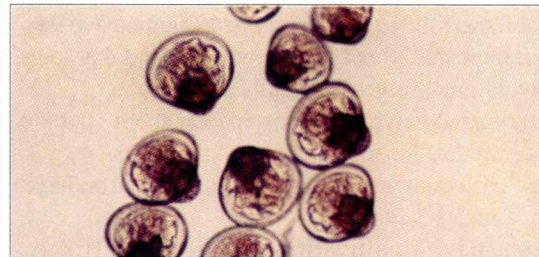
There are *Vibrio* bacteria which destroy the spats. Contamination is prevented by filtration and disinfection using chemicals (like hydrochloride). Abrupt changes in water salinity and temperature also affect the distribution of planktons that provide nutrients to the larvae.

“We have to ensure the quality or condition of spawners or parent shells from the wild. We have to be careful about food contamination. Failure to detect contamination in feeds which is usually due to the wrong culture of phytoplankton can result to mortality.”

☞ NEXT PAGE

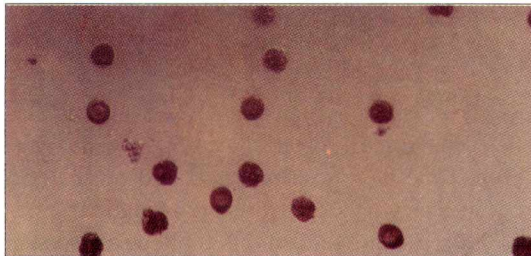
**THE PEARL OYSTER *PINCTADA MAXIMA*** PHOTOS BY SEA QUEEN AQUACULTURE SERVICES

*The pearl oyster spawning*

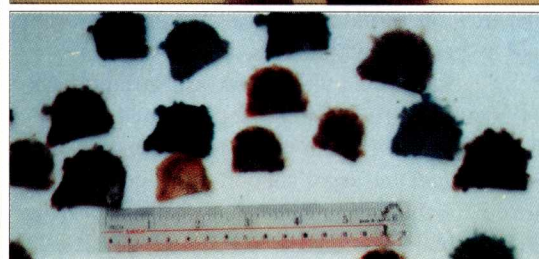


*Larvae, umbo stage; 7 days after fertilization, approximately 160 microns*

*Fertilized eggs, about 60 microns, approximately 2 hours after fertilization (bottom)*



*Spats; about 21 days old at 350 microns*



*Juveniles; about 55 days old; size ranges from 1.0 cm to 2.0 cm*



***Lines of irony.** Long lines used for the deployment or growout of pearl oysters also serve to encourage the growth of marine organisms. But they have caused the displacement of local fishers from their traditional fishing grounds*

And this is just in the hatchery stage. Mr. Badon said that at most, they get 20% survival rate of the 500,000 mother of pearls deployed in long lines. This is why one has to have a “deep pocket” to go into pearl farming.

But one perfectly formed pearl fetches as much as \$500 in the international market.

At present, most pearl farmers use 20% wild and 80% hatchery bred parent shells because they do not want to deplete the sources from the wild. They prefer to use hatchery-bred parent stock because they are able to determine its condition.

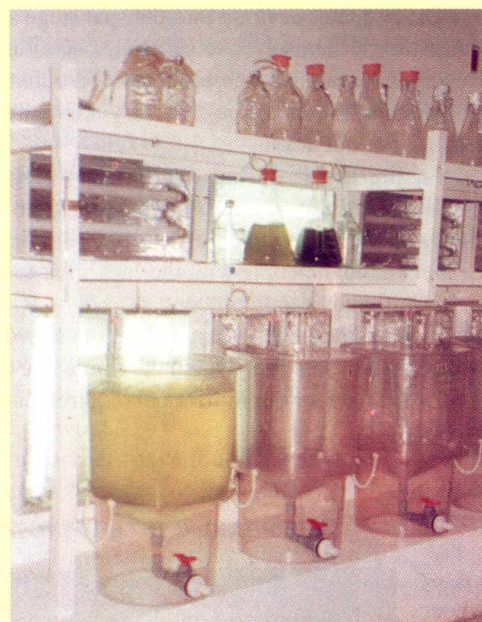
Pearl farming has also created some controversies in Busuanga. Local fisherfolk complain that pearl farms have displaced them from their traditional fishing grounds and that long lines obstruct navigational routes especially at night.

Mr. Badon estimated that pearl farms take up about 10-15% of Busuanga’s sea waters.

“But they can’t discount the benefits that the pearl farms have given back,” Ms. Sanchez said.

Jonathan Sacamay, a cultivation technician of Hikari, expressed that pearl farms have provided a permanent source of income to workers both in and outside the locality. (A lot of Hikari workers come from Iloilo and other parts of the Visayas.) They help preserve the marine ecosystem and enhance the fishery stock as long lines also serve as aggregating devices that attract marine animals to spawn. Pearl farms discourage the practice of dynamite and cyanide fishing as this can be destructive to the mother of pearls being cultured underwater. Prohibition is done with the cooperation of the local government who derives income from the rent being paid by pearl farm operators.

Ms. Sanchez suggested as an alternative sea farming to be run by a cooperative of local fishers to be implemented in cooperation with different government and non-government agencies in the locality for technical and legal support. The cooperative can put up an artificial substrate to keep the fish from moving out. They can go into shellfish and seaweed culture, besides.



*Algal production facilities at Hikari*



“These local fisherfolk would provide their own security to protect the area from poachers and other destructive elements because they have something growing in it.”

Mr. Badon said that this could be a response to the issue between pearl farms and fisherfolk about the full exploitation of the sea.

“At present, pearl farms have the upper hand because they have the capital, facilities and security people. Giving out support services for the local fisherfolk to do their own fish farming activities can help create a balance of power among the stakeholders of Busuanga’s marine resources.”

## Corals in Olango Island, Lapu-lapu City

Fishes are not the only marine species being farmed; corals are farmed too.

Coral reefs are among the oldest and the most biologically diverse element of the ecosystem. However, human activities have resulted to their near ruin. Most responsible for reef destruction is blast fishing. This, together with marine pollution, unregulated coastal development, deforestation and improved fishing gears bring about heavy pressure on coral reef productivity. Coral farming therefore offers a solution to this problem.

In the Philippines, a group from the University of San Carlos (USC) - Marine Biology Section led by Dr. Thomas Heeger and Dr. Filipina Sotto established the one and only community-based coral farm in the world with the objective of rehabilitating degenerated reefs. The Caw-oy Coral Farm, situated in Olango Island, Lapu-lapu City in central Philippines uses the fragmentation method following the concept that corals are capable of asexual reproduction. That is, they are vegetative and can regenerate by themselves fast.

“We are not transplanting corals but are just getting fragments or cuttings. We are very much against the idea of transplanting corals. It impoverishes the donor site. What would happen if the transplanted corals die? You would have two impoverished sites,” explains Joey Gatus, farm manager.

First, coral fragments or fist-sized cuttings are harvested from mother corals using pliers for the branching type (= *Acropora* spp. and *Pocillopora* spp.) and hammer or chisel for the massive (= *Favia* spp., *Favites* spp., *Montastrea* spp.), foliaceous (= *Mycedium* spp., *Echinopora* spp., and *Turbinaria* spp.) and encrusting (= *Montipora* spp. and *Podabacia* spp.) types. These are harvested from nearby reefs in the Olango island system. Trained and PADI<sup>5</sup> certified fisherfolk divers do the harvesting, as this is a crucial part of coral farming. Harvesting or cutting is done with precision and care so as not to harm the sensitive corals.

The harvested coral fragments are tied to a mactan stone (a limestone that acts as a substrate) using a galvanized wire, and are then transferred to the coral nursery units (CNUs) where they are left to regenerate and attach themselves to the substrate. It takes about three to four weeks for the fragments to be firmly attached to the substrate. Depending on the species, it takes one to three months for 6-8 cm coral fragments to grow into a suitable size ready for transplantation to a damaged reef.

CNUs are cement slabs measuring 1 m<sup>2</sup> (like a cement boxes without a top cover) that secure the fragments in place and protect them from sedimentation. One CNU accommodates an average of 50-60 coral fragments. CNUs are cleaned of sediment and algae and are monitored regularly. To date, the two-hectare Caw-oy farm has 286 CNUs with an estimated 22,000 coral fragments of 103 species of corals farmed.

<sup>5</sup>Professional Association of Diving Instructors

“We have already rehabilitated several reefs here in Cebu. We have deployed 4,000 coral fragments in the Plantation Bay Hotel and about 2,000 in Camotes Island. We are willing to give hands-on trainings to those who are interested to undertake this endeavor,” offers Gatus.

The farm will be three years old this October. The corals are already big and can now serve as donor or mother corals. In fact, Gatus and company are now planning for a second generation fragmentation.

On the other hand, the social component of coral farming is one important aspect for its success. Gatus explains that coral farming will not succeed if there is no commitment on the part of the community to support the project. It is difficult to sustain such program if the community does not understand the principles behind it and does not participate in its operation and maintenance.

The Caw-oy Coral Farm involves around 25 families in its operation. Eight members are certified divers who are involved in the harvesting and deployment of coral fragments. They are also responsible for the maintenance of the CNUs. They are paid P200 per dive. The women, on the other hand, take charge of

➤ NEXT PAGE

*Joey Gatus shows a 3-year-old spiny staghorn coral *Acropora* *echinata* ready for second generation fragmentation*



J LAGARE

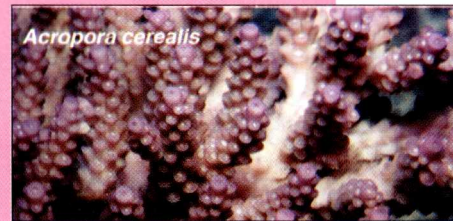
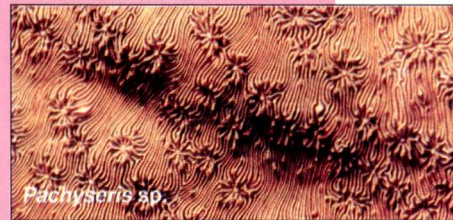
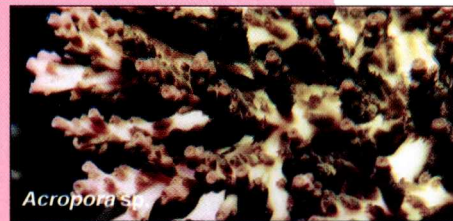


RIV ADAN

*The floating guardhouse serves as a working platform for the coral nursery, reception area for tourists and a starting point for the “coral trail”*

**Some of the coral species  
cultured at Caw-oy Coral Farm**

PHOTOS BY THOMAS HEEGER



tying the coral fragments to the limestone and are paid 60 cents per fragment. They usually finish 1,000 fragments a day. The farm also receives many local and foreign visitors that the Caw-oy families help entertain with cultural presentations and a demonstration of coral farming techniques. There is also the underwater coral trail, a must-see feature of the farm.

The Caw-oy coral farm was initially funded by USC and the German Technical Cooperation. At present, it is operated through a funding from the International Marinelifelife Alliance (IMA) under its Coral Reef Rehabilitation Program. IMA is a non-profit, non-government marine conservation organization founded to help conserve marine biodiversity, protect the marine environment and promote the sustainable use of marine resources for the benefit of local stakeholders.

## Coral farming

### COMMUNITY-BASED EFFORTS FOR REEF REHABILITATION, BIODIVERSITY CONSERVATION, AND AS A LIVELIHOOD OPTION FOR FISHERFOLK

PHOTOS COURTESY OF THE CAW-OY CORAL FARM / T. HEEGER



*A diver cuts off hard fragments of *Acropora valenciennesi* with pliers*



*Fragments of strong-built ranching or other coral life forms are chipped off with hammer and chisel*



*One week after cutting off fragment, the margin of a *Porites* colony has already started to overgrow the scar (arrow)*



*Five weeks after fragmentation, the area has been completely overgrown (arrow)*



*The fisherfolk are trained in fixing the coral fragments to the hard substrate*



*All fragments are placed inside a concrete square (1 m<sup>2</sup> inner area), which defines the Coral Nursery Unit (CNU), at a density of 50 to 60 fragments. The CNU wards off predators and the plastic canvass prevents the fragments from falling down due to the intensive activities of infauna and fish*



*A fragment of *Acropora divaricata* 12 weeks after fragmentation. The secondary basal disc stabilizes the fragments on the substrate. Newly-formed ranches (arrows) follow the natural symmetry of the coral colony*



*Numerous buds on the side of *Galaxea fascicularis* fragments document fast regrowth at the fragmented site. This species is quite aggressive and needs to be distanced from other species as it can extend its sweeper tentacles up to 15 cm at night and harm adjacent coral colonies*



*An experimental set up of *Acropora grandis* fragments fixed horizontally and vertically (background) on the substrate with laminated grids to document the area and time interval of secondary basal disc formation according to vertical or horizontal orientation of the fragment*

➡ NEXT PAGE





*A view inside a CNU showing some of the 50-60 fragments. The number of fragments, which can be placed together, is species- and initial fragment size-dependent*



*An area of a nearby reef, which has been rehabilitated with tagged fragments of 22 different hard and soft coral species*



*A SCUBA diver checks the growth of fragments*

#### **"UPDATES IN THE PHILIPPINES"**

IS WRITTEN BY AP SURTIDA (SALINE TILAPIA),  
MB SURTIDA (ABALONE AND MUDCRAB),  
AJ ESPAÑO (PEARL OYSTER) AND  
RIY ADAN (CORALS)

#### **SEAFDEC/AQD marine fish hatcheries ... from page 49**

Viral and bacterial infection threatens hatchery production. Vibriosis associated with the appearance of red spots in the tank bottom and sides is effectively controlled with the application of freshwater directly to the infected area. Another common disease problem is the swim bladder stress syndrome (SBSS). Often mistaken as the gas bubble disease, SBSS is due to environmental stress contributed by high stocking density accompanied with high levels of ammonia. Preventive measures include the maintenance of good water quality, adequate nutrition, and reduction of environmental stress.

#### **Production**

Production of the eggs and fry of marine fishes at the AQD hatcheries vary. Milkfish eggs and those of other species not utilized for R&D experiments are sold to marine fish grow-out operators at 25% and 20% less the current prevailing market price, respectively.

Last year, AQD marketed a total of 1,822,247 fry (milkfish, 1,788,000; sea bass, 3,300; rabbitfish, 3,000; grouper, 20,796; and red snapper fry, 74,844) amounting P1, 250,944 (US\$25,019) to fish farmers in Manila, Pangasinan, Bulacan, Negros, Cebu, Leyte, and Panay (except Antique).

#### **Egg disbursement "program" to private sector**

With the creation of the Technology Verification and Extension Program (now known as Technology Verification and Commercialization Division) in mid-1996, AQD focused its efforts in promoting the commercialization of new and mature aquaculture technologies. This program facilitates the use and adoption of commercially viable aquaculture technologies to different beneficiaries in the region's aquaculture industry - big and private entrepreneurs, farmer and fisherfolk cooperatives, local government units, and other academic and research and development institutions.

In 1998, AQD has instituted a Pond Cooperators Project that would continue to evaluate the performance of hatchery-reared milkfish fry in commercial grow-out scale. The cooperators are given up to 100,00 hatchery-reared fry for free on the agreement that they grow the fry using their own management and culture techniques and AQD can monitor pond production and other data. Recipients say that the hatchery-reared fry that were given with Vitamin C-enriched diets showed more resistance to stress and grew faster.

#### **REFERENCES**

- Duray MN. 1993. Larviculture of marine fishes at SEAFDEC/AQD, p 127-132. IN: Villegas CT, Castanos MT, Lacierda RB. Proceedings of the Aquaculture Workshop for SEAFDEC/AQD Training Alumni, Sept 1992, Iloilo. SEAFDEC/AQD, Iloilo, Philippines
- SEAFDEC/AQD. 2000. Advances in Aquaculture Research and Development - Biennial Report 1998 and 1999. SEAFDEC/AQD, Iloilo, Philippines