Collaborative project to develop post-larval capture and culture methods in Pohnpei, Federated States of Micronesia: A sustainable way of supplying the ornamental fish market

Post-larval capture and culture trials in Pohnpei

Following an agreement between the Coral Reef Initiatives for the Pacific (CRISP) programme in Noumea, New Caledonia, the Marine and Environmental Research Institute of Pohnpei (MERIP), Federated States of Micronesia, and Hawaiian SeaLife in Honolulu, project funds were granted to develop post-larval capture and culture (PCC) techniques to supply Hawaii's marine aquarium trade.

When the project started in early 2010, Simon Ellis and his staff from MERIP had already been fishing for several weeks. Two light traps had been used, and there were some encouraging results, despite poor weather conditions that prevented fishermen from deploying the traps outside the lagoon where fish recruitment is likely to be higher and where species diversity is greater. Various types of fish had been collected on a regular basis, such as damselfish (*Pomacentrus pavo, Chrisiptera leucopoma*) surgeonfish (*Acanthurus triostegus, Ctenochetus striatus, Naso brevirostris*) and butterflyfish (*Chaetodon lunulatus, C. ephippiuma, C. vagabundus*). Some of these species have interesting commercial value from a PCC point of view (i.e. non-traditional wild-caught fish market).

Now, some fishermen are paid by MERIP to fish at night, set the traps and retrieve them in the morning with the catch. The fishermen prefer to monitor the equipment overnight to avoid any risk of theft and be able to retrieve the catch at first light. Fishermen receive USD 30 per night to fish. In the future, they would need to make a minimum of USD 20–30 worth of commercially desirable post-larvae per night to sustain this activity. As part of this project, the economics of PCC must be understood in Pohnpei in order to ensure the long-term viability of this activity.

Assembling and deploying crest netting equipment

A crest net was designed and made in New Caledonia, and then brought to Pohnpei to carry out experimental crest netting trials. A 320-mm pipe was imported from the Marshall Islands Mariculture Farm and assembled as a cod end for the crest net (Fig. 1). This matched the end of the net perfectly and overall, the net was strong and suitable for being deployed on the reef crest.

The crest net was deployed in two different areas. The first location was a reef top where a strong current flushes the water from the windward side of the island towards the lagoon. The net was securely tied to the reef top and between mangrove trees because the reef structure was too dense to allow any rebar pegs to be driven through it (Fig. 2). Unfortunately, there was too little water flowing during low tide in this area at night and the fisherman assigned to monitor the net came back with only a few dead specimens.

The second site sampled was a channel that was excavated from a lagoon reef. It had many advantages: 1) the pegs could easily be planted into the substrate, 2) the net remained well underwater all night, and 3) with the current weather pattern, the windblown water would be pushing the current through the net continuously. However, yields in this area were not high, probably because most fish in the area had already recruited in the lagoon and because the flow was sometimes too slow, allowing larvae to swim out of the net.

Further sites were surveyed on the barrier reef around MERIP. One site had good potential but the reef top was too hard, making it difficult to anchor the net. Another site with good potential was a narrow reef top with good incoming flow and areas to keep the cod end constantly underwater. MERIP staff will keep conducting net sets at dif-

Figure 1. The crest net with a 320-mm PVC pipe fitted as a cod end.

Figure 2. The crest net set on the reef top between mangrove trees.

ferent areas until an optimal location is found for the crest net.

Post-larval husbandry

MERIP has an indoor wetlab with four flow-through 100-L glass tanks. It was recommended that these aquaria be used for a one-week weaning period before fish were transferred to an outdoor system. Indoors, fish are sorted by species and fed with live *Artemia nauplii* until formulated diets are introduced. A small system to feed fish with *Artemia nauplii* continuously was demonstrated.

Once the fish fully accept the commercial diets, they are transferred to an outdoor system made of four raceways (2,000 L each), which are divided with *hapa* nets where fish can be separated by size and species.

It takes only a few weeks for the fish to reach commercial sizes when they are fed on formulated diets. They will then be graded and packed for export.

Future plans for post-larvae exports

MERIP, as part of this project, intends to start trial shipments of post-larvae by the end of 2010. Initial stocks will be shipped to Hawaiian Sealife Inc. in Honolulu. Hawaiian Sealife is currently expanding its scope of operations in many different directions. PCC has gone in several directions, including a push to market juvenile fish into the marine aquarium trade, and a school programme where students can observe their fish growing and changing over the course of a semester. Overall, Hawaiian Sealife will work on promoting PCC techniques and the location, on the aquarium market. They will use their newly built facilities, located near Honolulu International Airport. China is also coming up as a new and vast market for this type of aquarium product.

The biggest ornamental aquaculture facility in the world — Oceans, Reefs and Aquariums — is also interested in developing a line of PCC products. They are well aware that closed cycle technology for many species is still years away and in their "all cultured" policy they could buy and sell many PCC products. This is a path that MERIP will want to further explore in the future.

Other activities at MERIP

MERIP has been promoting other types of activities in the past few years, including sponge and coral farming. Both activities have been increasing and there are now over 20 sponge and coral farmers on Pohnpei Island (Fig. 3).

Sponge seems to grow very well in open areas near lagoon passes where there is considerable current flow. An individual small-scale farm can hold from 1,000 to 2,000 pieces of sponge, which takes two years to grow. They are then washed in a washing machine and cleaned prior to export. They are sold in New Zealand and have had successful market response. The trend here is on the increase.

Figure 3. A sponge farm in Pohnpei.

Corals are also being grown by a small-scale private farmer who sells them to MERIP, which oversees the export. All corals are exported to the Marshall Islands where they are grouped with Marshall Islands Mariculture Farm shipments to Oceans, Reefs and Aquariums in Florida, USA. Corals that have been cultured thus far are soft corals (leather corals, *Zooanthus* spp.), small polyps from hard corals such as *Acropora* spp., and large polyp from hard corals such as bubble corals or torch corals (Fig. 4).

Figure 4. Soft corals farmed in Pohnpei.

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