

VANUATU'S FIRST ORNAMENTAL ANEMONEFISH (*AMPHIPRION* SPP.) HATCHERY TRIALS

As part of the Australian Centre for International Agricultural Research (ACIAR) project "Development of aquaculture based livelihoods in the Pacific Islands region and tropical Australia" (FIS2006/138), Vanuatu's Fisheries Department, the Japan International Cooperation Agency (JICA) and the Secretariat of the Pacific Community (SPC), will launch a small-scale anemonefish farming trial in Vanuatu. The aim of this project is to determine whether anemonefish farming could be a viable activity in rural areas of Vanuatu. It is hoped that with technological advances becoming more accessible, such activities could extend to other part of the Pacific Islands region where the aquarium trade is active.

BACKGROUND

The global demand for aquarium fish has been estimated to worth USD 200–330 million per year (Wabnitz et al. 2003). The ornamental trade is a significant source of income for over 10 Pacific Island countries, and it was recently determined that over 1000 households are involved either fully or on a part-time basis in the trade. The need for income generating opportunities, which in the rural Pacific often involve coastal resources, is growing rapidly given the region's increasing human population growth (especially in Melanesia) (Bell et

Plankton collection trials at night using a spotlight and a 50µm scoop net.

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al. 2008). Sound management of the wild-capture fishery and the promotion of mariculture appear to be sustainable options for trade in the Pacific region.

Maricultured commodities such as giant clams and corals have proven to be reliable sources of cash in rural areas (Teitelbaum and Friedman 2008; Lal and Kinch 2005; Vanuatu Fisheries Department 2008). Although the aquaculture of marine ornamental fish is in its infancy, it holds great promise as an alter-

native livelihood option for fishers in the region (Job 2005). Full-cycle aquaculture currently accounts for only 1% of the global trade in marine aquarium fish (Wood 2001), with approximately 50 species routinely produced commercially. These species are primarily anemonefish, dottybacks, gobies and seahorses (RCT 2006). In order to be competitive with wild-caught products, maricultured products need to be of high quality, in high demand, and produced reliably in sufficient numbers to be economically viable.

Globally, anemonefish (*Amphiprion* spp. and *Premnas* spp.) are among the most popular marine aquarium fish. Hatchery production of anemonefish is practiced commercially on a routine basis in many developed areas (e.g. USA, Europe, Australia and Asia). However, grow-out of



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those fish in open cages in rural areas of the Pacific is a new concept, but could provide communities with livelihood incomes while also reducing the pressure on wild-caught animals. Anemonefish are highly sought after in Vanuatu, and are caught by professional divers and exported by private companies. The average number caught annually is between 5000 and 10,000 fish (VFD 2007, 2008). The uncommon colour morph of *Amphiprion melanopus* can fetch between USD 4 and USD 5 per fish, export price.

FORECASTED HATCHERY AND GROW-OUT PHASES OF THE PROJECT

In July 2008, SPC's Aquaculture Officer went to Vanuatu to begin organising the hatchery,

including setting up broodstock and larval rearing areas, purchasing broodstock from local ornamental fish exporters, preparing specific broodstock feed, and performing plankton collection trials.

Vanuatu's Fisheries Department has suitable facilities for running a small-scale aquarium fish mariculture project. Their newly renovated hatchery has a laboratory, raceways/production units, and access to open ocean sites with boats. Four small concrete raceways (1000 liters) were set up as broodstock tanks. A total of 35 different sized *A. melanopus* were placed in three of the four raceways, together with bubble anemones (*Entacmea quadricolor*) that were collected on the reef off Efate's northern coast. Similarly, 18 *A. clarkii* were placed in a

raceway together with their host, the long tentacle anemone, *Heteractis crispus*.

Anemonefish are pair mating and protandric hermaphroditic fish (i.e. males change into females). They lay demersal sticky eggs, which are looked after until hatching. Under optimum conditions, a mating pair will spawn every two to four weeks during summer when the water temperature reaches 27–28°C.

Larval rearing, nursery culture will be undertaken at the facilities using established techniques. Once the fish reach 2 cm they will be transferred to ocean grow-out sites.

The grow-out sites will be located on the reef near a community on Efate's north coast (half an hour's drive from Port Vila), where there is already a giant clam grow-out station and where aquarium fish collection companies have operating licenses. Vanuatu Fisheries Department staff will be in charge of introducing the anemonefish grow-out project to villagers and selecting key operators in the village, prior to initial trials.

Once juvenile clownfish can be produced routinely from the hatchery, a trip will be undertaken by SPC's Aquaculture Officer, Vanuatu's Fisheries Department staff, and JICA personnel to introduce farming techniques in floating cage systems. Initial trials will determine growth and survival of clownfish in the simplest possible cage set up. Low cost, readily available feed (e.g. minced shrimps, fish or crushed shellfish) will be identified with the villagers.

Top. One-tonne raceways used at Vanuatu Fisheries Department for the project.

Bottom. *Amphiprion melanopus* and *Amphiprion clarkii* at an export facility.



HOW WILL FARMERS BENEFIT FROM FARMING ANEMONEFISH?

A. melanopus (Vanuatu clownfish) are exported at USD 4–5 per fish. It is likely that village farmers could expect to receive around USD 2–2.5 per fish, farm-gate price. It is anticipated that farmers will have the capacity to produce several batches per year, with each batch composed of 100 clownfish of 3-4 cm, according to market demand. Thus, a clownfish farmer could expect to make between USD 200 and USD 250 per shipment, repeating the process several times a year. This activity could complement other activities such as giant clam farming.

Previous experiments were shown to be profitable in other areas of the Indo-Pacific such as the Philippines (Pomeroy and Balboa 2004). If the hatchery technology for anemonefish is successful in Vanuatu, there should be attempts at transferring it to the private sector. Aquarium fish exporters could supply clownfish juveniles and buy back commercial size anemonefish (on the same model as giant clam farming).

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A dark phase of *Amphiprion clarkii* in *Heteractis crispa*.