

Creating an aquaculture industry for a new type of freshwater prawn in Papua New Guinea

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*The first ever successful spawning and rearing (from egg to juvenile stage) of the Papua New Guinea (PNG) river prawn, *Macrobrachium spinipes*, took place in the first half of 2014. This success is Phase One of a project to evaluate commercial aquaculture of this prawn in PNG. The undertaking involved a team of SPC, PNG National Fisheries Authority (NFA), and University of Papua New Guinea (UPNG) scientists and students.*

There is a demand for prawns and other seafood in PNG, but freshwater prawns have never been commercially farmed there, even though *M. spinipes* (formerly classified as *M. rosenbergii* “eastern strain”) is indigenous to PNG. The main barriers to freshwater prawn farming in PNG have been a lack of capacity to culture prawns through the technically demanding hatchery phase, and a lack of scientific knowledge about the breeding and growth characteristics of this PNG prawn variety.

Project background

In order to address capacity and knowledge gaps, NFA requested SPC to develop a research project, which would be supported by the Government of Australia. The Australian Centre for International Agricultural Research project FIS/2011/049, “Evaluation of the potential for commercial aquaculture of the freshwater prawn *Macrobrachium* in Papua New Guinea”, is a research collaboration between prawn farming experts in SPC’s Aquaculture Section, NFA’s Freshwater Aquaculture staff, and academics and students of the School of Natural and Physical Sciences at UPNG’s Waigani campus.

Phase One of the project involved building a prawn hatchery in Port Moresby, and conducting exploratory fishing to find a reliable source of broodstock prawns among the rivers of PNG’s Central Province.

Phase Two consisted of hatching prawn eggs in captivity and rearing the planktonic larvae through to the juvenile adult stage, and training PNG nationals in prawn hatchery techniques.

For the third and final phase, we will conduct an economic analysis of prawn grow-out and marketing, and then develop a package of information about freshwater prawn aquaculture that will be made available to investors in PNG.



Prawn post-larvae being counted ready for delivery from the hatchery to a commercial grow out pond at Sogeri near Port Moresby.



*Presence of teeth on both the upper and lower sides of the rostrum confirm that this specimen of *Macrobrachium spinipes* has developed to the post-larval stage.*

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Hatchery technique

A prawn hatchery was constructed and equipped at UPNG's Waigani campus in Port Moresby. Prawn broodstock-bearing eggs were collected using crab traps in Agevaru River, which is a three-hour drive from Port Moresby. We used a green water (water enriched with micro-algae) hatchery technique based on standard methods developed in Fiji for *M. rosenbergii*. Green water was created from tilapia tank water, and this was added daily to the prawn larvae tank water to stabilise the water quality and act as a pro-biotic. The larvae were fed live brine shrimp (*Artemia*), egg custard and squid custard. The tank water was changed when deemed necessary from observations of water quality and larval condition, and this averaged about one 50% change per seven days, which greatly saved on the amount of seawater that needed to be brought in by truck.

The first hatchery run of *M. spinipes* was attempted in April–May 2014. We expected the first attempt to fail because there are always problems at the start. But to our pleasant surprise, the larvae progressed steadily through

all 11 larval development stages. The first post-larvae, which appeared in the tanks on day 27, were strong, active, clean-shelled, and brightly coloured — all indicators of good larval health.

We observed a wide variety of larval sizes and stages from the same egg clutch: stage V through X could be seen in the tank at the same time. All stages ultimately metamorphosed from larvae into post-larvae. Our conclusion is that *M. spinipes* poses no special challenges in the hatchery compared with *M. rosenbergii*.

Grow-out to market size

Once acclimated from the brackish water conditions of the hatchery to fresh water, the post-larvae were released into tilapia ponds and into tilapia cages, at a commercial tilapia farm in Lake Sirinumu near Port Moresby. Because the quantity of post-larvae produced was in excess of requirements for this trial, some were sent by air to Lae and placed in ponds at another tilapia farm at Potsie (near the Markham River bridge). A further batch of prawns has been stocked into ponds purpose-built for a prawn grow-out trial at Kanosia in Central Province. Culture characteristics of *M. spinipes* during grow-out will be assessed, and any technical constraints will be identified for follow-on research.

A technical and economic information package about this prawn species will be developed, based on the project results. This will be made available to potential investors in freshwater prawn aquaculture in PNG. Meanwhile, NFA staff and UPNG staff and students have been trained in prawn hatchery operations. They are now preparing for another hatchery run of their own, scheduled for later this year.

We are aware of only one other successful rearing of an “eastern” strain of *M. rosenbergii* (now re-named *M. spinipes*), which was by Samoan MSc candidate Malvine Lober under the supervision of Chao Shu Wu at James Cook University in Townsville, Australia. According to results of Peter Mather's genetics research group at Queensland University of Technology, theirs was a different lineage from the PNG “eastern” variety. So this is the first time that the genetic type of prawn found in PNG has been successfully bred and reared in captivity.

The hatchery team who completed the first hatchery run of *M. spinipes* included Timothy Pickering, SPC FAME Division, Inland Aquaculture Specialist; Avinash Singh, SPC European Union-Increasing Agricultural Commodity Trade project (IACT) Aquaculture Officer; Jone Varawa, SPC EU-IACT Aquaculture Technician; Gideon Pama, NFA Manager Freshwater Aquaculture; Robin Totome, Lecturer, Division of Biology, School of Natural and Physical Sciences, UPNG; Ralph Mana, Lecturer, Division of Biology, School of Natural and Physical Sciences, UPNG; David Anan, student, UPNG; and Cornelius Aiyapi, student, UPNG.



From left to right: Gideon Pama (NFA), Cornelius Aiyapi (UPNG) and Jone Varawa (SPC) at work in the prawn hatchery constructed under the ACIAR project at UPNG in Port Moresby.



The UPNG prawn hatchery hosts a visit by John Kasu, Managing Director of PNG National Fisheries Authority (2nd from right) and Jacob Wani, Principal Scientist of the NFA Aquaculture and Inland Fisheries Unit (far right). Tim Pickering of SPC holds a bowl of prawn larvae, while Ralph Mana (2nd left) and Robin Totome (3rd left) of UPNG's Division of Biology look on.