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Native shrimp cultured in Cameroon

Responsible Seafood Advocate logo
1 January 2013 G. Gaudin J. Makombu O. Njifondjou E. Mialhe

Work could lead to aquaculture activities in fisher communities

The production of *F. notialis* could be based on small artisanal tanks according to a multiphase culture process in family and community units.

Shrimp aquaculture in Africa is still in its infancy, despite the fact that much of the country's coastal land has climate and water qualities suitable for shrimp farming. Several projects have been developed in various parts of the continent, including the establishment of large shrimp companies in Mozambique and Madagascar in eastern Africa, and to a lesser extent in Eritrea, Gambia, Guinea, Seychelles, South Africa and Tanzania.

Three ecologically and culturally important areas targeted for industrial shrimp-farming operations include the Niger Delta in Nigeria, the Tana Delta in Kenya and the Rufiji Delta in Tanzania. However, other smaller delta areas are also important potential sites for community shrimp farming – in particular Cameroon, whose name is derived from the Portuguese word for shrimp.

Africa's large shrimp companies tend to produce one of the two most important cultivated shrimp species. While Madagascar and Mozambique established their production with the native species *Penaeus monodon*, other countries have introduced the exotic *Litopenaeus vannamei* from South America.

Culture of these shrimp does not differentiate African aquaculture from that of other shrimp-producing countries. Moreover, African farms have been dramatically affected by the viral diseases that affect *L. vannamei* and *P. monodon* all around the world.

Native shrimp

Farfantepenaeus notialis, marine shrimp native to Cameroon, have been dramatically overexploited by local and foreign artisanal fishermen as well as industrial fishermen. The official captures decreased from 35,000 metric tons (MT) in 1999 to 11,000 MT in 2010. Consequently, the species has a high commercial value on the national market, which would help the successful development of its aquaculture. Moreover, this species has a beautiful appearance that makes it attractive to consumers.

In 2009, an experimental project based on *F. notialis* was established in Cameroon by Salomon Madiba Songue, traditional chief of the coastal Bakoko community (Aquasol S.A.), French humanitarian nongovernmental organization Bleu Cameroun and the scientific team of Concepto Azul, which specializes in shrimp aquaculture and biotechnology.

The three partners initially built a rustic hatchery close to Kribi, where broodstock of the native shrimp were available from local fishermen. Two years later, the hatchery was moved to Kribi to a new building belonging to the Institute of Agricultural Research for Development (IRAD).

Because of the lack of local shrimp aquaculture technicians, the project started with the training of a Cameroon technical staff who began the experimental work with the support of a French specialist from Concepto Azul. During the development of the project, training was held for IRAD scientists, students from Buea and Douala universities, and young people from coastal communities and poor neighborhoods of Douala.

Maturation, spawning

Over the last two years, wild *F. notialis* females with mean body weights of around 35 g and males with mean body weights around 25 grams were collected by local fishermen and acclimated in the hatchery within 12-m^3 circular tanks lined with black plastic. Water pumped from the sea through an under-sand system was renewed by constant flow at 100-150 percent/day and aerated with a continuous air-lift system. Water temperature was kept between 28 and 29 degrees-C with automatic thermoregulation. The broodstock were fed at 10 percent body weight/day with locally available marine mollusks and small fish.

Daily observation identified gravid females, either naturally matured animals recently arrived from the sea or those kept in the hatchery and artificially matured. At the fourth gonad development stage, the gravid females were easily recognizable by their large gray ovarian lobes. For spawning, females were placed individually in 100-L concrete tanks. Eggs were collected with a fine mesh and kept under constant light until hatching.

Fecundity has been estimated around 6,000 eggs/gram of body weight. Fecundity and hatching rates were very high at over 80 percent for naturally copulated females at their first spawn. Eggs obtained from artificially matured females were less numerous with lower hatching rates. Nauplii activity and quality were better from the naturally matured females than the artificially matured ones, showing the need to improve feed formulation for maturation.

Optimal conditions

Maturation tanks lined with black plastic hold shrimp in filtered sea water.

Because of the small tank size, larviculture experiments were performed with batches of around 10,000 nauplii. Larval development and culture were optimal at 29 to 31 degrees-C and salinity of 29 ppt. At the three zoe stages, the cell density of *Thalassiosira pseudonana* was maintained around 100,000 cells/mL. Mysis and postlarvae (P.L.) stages were fed with hatched *Artemia salina* cysts and microparticular commercial feed.

Food amounts were adjusted daily according to survival, generally between 40 and 60 percent at $P.L._{20}$. In order to evaluate the possibility of cultivating *F. notialis* in areas with low salinity, experiments performed with $P.L._{20}$ showed their ability to develop between 5 to 35 ppt, with optimal growth at 25 ppt.

Additional experiments were performed every year at small scale to evaluate the growth of the P.L. produced in the hatchery. In parallel, artificial feed was prepared with local ingredients. It has been possible to grow larvae to adult stages in the lined tanks, with the best growth leading to 25-g shrimp in one year for animals fed local artificial feed and fresh sardines.

Perspectives

The project developed in Cameroon allowed control of all the developmental stages – adult maturation, spawning, egg hatching, larval culture and animal growth – in captivity. Consequently, *F. notialis* can be considered a candidate for aquaculture production in Cameroon and neighboring countries where this species is natively present.

The production of *F. notialis* could be based on small artisanal tanks according to a multiphase culture process in family and community units with the technical support of Cameroonian specialists and institutions.

Because of the progressive involvement of Cameroonian scientists and university students, the initial limited local staff with foreign specialists has changed to a Cameroonian multi-institutional staff. Cameroonian scientists who specialize in biochemistry will work to improve local feed formulations for better maturation and growth. Molecular biologists will work to prevent viral and other diseases through the use of molecular diagnostic tools. Moreover, these specialists will collaborate with the scientists of Concepto Azul to manage a breeding program to improve *F. notialis* growth and disease resistance through gene-assisted selection using gene markers.

Originally undertaken with the leadership of a traditional chief as a strategy to develop new aquaculture activities in traditional fisher communities, further development of *F. notialis* culture would now be supported financially and politically through the leadership of the Cameroonian government, since the president and research minister have expressed their willingness to develop marine and freshwater aquaculture. International funding institutions should also consider supporting this initiative, not only in Cameroon, but also in other African countries.

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