

SEAFDEC's bighead carp hatchery technology

By **NJ Dagoon**

SEAFDEC started bighead carp research in the early 1980s at its Binangonan Freshwater Station (BFS) along Laguna de Bay. BFS has achieved significant research results in artificial propagation, nursery and polyculture. This led to the expansion of carp culture, particularly bighead. Commercial culture of carp in fish pens started in 1985, following the establishment and proliferation of carp hatcheries around the lake. Distinct carp fisheries have also formed in the Cagayan river system, Cotabato-Agusan River System and in lakes of Camarines Sur and Mindanao.

In the 1980s, successful gonadal maturation and rematuration of bighead carp reared in cages in Laguna de Bay was achieved. This showed that in tropical areas, carps may spawn several times in one season. Average fecundity of a good performing female is 70,000 eggs per kg with a rematuration frequency of 60 days. Sexual maturation may be attained between 1-2 years.

Since bighead carp is not known to spawn naturally in captivity, seed production is supported by artificial techniques. Spawning by hormonal treatment has become a common practice.

Carp hatchery-nursery systems technology is described in a separate article.

What follows is an interview with SEAFDEC researches Dr. Corazon Santiago and Engr. Emiliano Aralar.

How much of BFS facilities are devoted to carp culture?

Engr. Aralar: Ten to 15% of BFS facilities are devoted to carp culture. These include the following: 1 unit, 12-ton conditioning or spawning tank; 15 units, 1-ton fiberglass tank for fry rearing; 12 units, 130 l hatching jars; 2 units, floating cages (5 x 10 x 5 m) for broodstock development; and 26 units, of floating cages (5 x 10 x 5 m) for rearing of carp fingerlings.

How much is your estimate of the current demand for carp fingerlings? How much is SEAFDEC providing?

Engr. Aralar: The industry needs about 15 million fingerlings per year. As a research institution we only provide products for research and training; the excess is sold to farmers. We sell at usually 20% lower than the current price. Five- to ten-day-old fry cost about 10 to 15 centavos apiece, while 1-2 month old fingerlings are sold at about P1-2.

How much is the average production per run?

Engr. Aralar: It depends on the weight of female breeders. About 10,000 to 30,000 fry can be obtained per kg weight of female breeders.

What technologies in carp broodstock and hatchery techniques have SEAFDEC developed?

Dr. Santiago: Carp hatchery technology is well-established and I like to believe that it started really at SEAFDEC particularly the BFS.

BFS is responsible in finding out or demonstrating that bighead carp broodstock can mature in the Lake. Previously, we obtained broodstock from ponds. We thought all the while that bighead carp broodstock will mature only in ponds wherein riverine conditions can be simulated.

BFS is also responsible for finding out in the laboratory that the hardness of the incubation water should be increased to about 300 to 500 mg per liter as calcium carbonate (CaCO₃). If we go down below 300 mg per liter, eggs would burst during incubation.

We also developed protocol for induced spawning of bighead carp. We use commercially prepared hormones, instead of carp pituitary and another important

thing, we conduct many training programs for technical staff of different hatcheries around Laguna de Bay.

How did private industry learn about the technology?

Engr. Aralar: Some fishfarmers undergo training at SEAFDEC. Some operators get technology through employees of SEAFDEC involved in carp study. In addition, we are also planning to package training courses for one week on tilapia, bighead carp and catfish.

Has carp hatchery technology been verified?

Dr. Santiago: There has been no formal study on bighead carp hatchery verification, but those who come here to see what we're doing and who have established their hatcheries, have verified for themselves the technical and economic viability of operations. That's why you find hatcheries that have been operating for many years—they verified the technology themselves.

Can you give us some findings of a recent study you have done on carp?

Dr. Santiago: In my two long-term studies on the influence of feeding on broodstock reproductive performance and egg viability, it's been shown that it's really worthwhile feeding the broodstock, because it would increase the viability of fry. Problem is, with the bighead carp broodstock, we are dealing with big fish which is really expensive to maintain. When one goes around the lake, one can see that nobody really is feeding the broodstock, farmers are just content with the natural feed in the lake and the natural performance of broodstock. I think that further studies should be done to determine how soon before spawning should fish be fed to improve their performance rate.



CLOCKWISE
Bighead carp broodstock cages at BFS; carp female being given the priming dose of LHRHa hormone; monitoring carp egg development in hatchery jars



SEAFDEC researchers Dr. Corazon Santiago and Engr. Emil Aralar

Engr. Aralar: Right now in Laguna Lake, broodstock development and maintenance is a problem due to typhoons. Inbreeding also results in the presence of abnormalities in the form of color mutation and deformities.

To solve them, develop and adopt selective breeding and simple mating schemes to help minimize inbreeding and if possible, produce stock from original sources like China and Taiwan.

Dr. Santiago: In general, there is a shortage of carp for stocking in grow-out areas. Performance of broodstock is not consistent. For grow-out farmers who raise bighead carp to marketable size—the price of fish sometimes gets very, very low; the margin of profit's very small. But if they produce in bulk their profits will also increase.

What do you think are factors to ensure successful adoption of carp hatchery technology in other areas/by first-time aquaculturists?

Engr. Aralar: Financial support will be a great factor and also acceptability of carp in other areas.

Dr. Santiago: There should be an appropriate site, a demand for the fish and trained or trainable staff to work and operate the hatcheries.

That's still something that has to be researched, because right now, even if one establishes that feeding would improve performance and viability of the fry, this won't be picked up by industry because feeding is expensive.

What economic program of the national administration does SEAFDEC's carp program seek to address?

Dr. Santiago: It addresses food security because bighead carp is a fast-growing fish and is a relatively cheap fish. It also addresses poverty alleviation because carp hatcheries are farms that require manpower to operate.

What are the common problems confronting carp hatchery technology/other aspects of carp culture? How can carp culture problems be solved?

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too many might saturate the market for grow-out.

The BFAR Center produces only around 20,000 to 50,000 fingerlings per production schedule. It sells these one-month-old hatchlings at a price much lower than the private sector does (P1 thereabouts), for 30 cents apiece. Spawning runs are done at the Center 5 to 6 times a year.

Existing market conditions suggest not much demand for common carp in Manila. In Lucban, Quezon and the Bicol region, however, carp prices range from P90 to P120 a kg.

Bighead carp is usually sold disguised as a marine fish (e.g., maya-maya) in big city markets. Its sections are priced differently: the head region, P45-50; head to belly, P70 and the tail portion, P45.

The Center does acknowledge the need to promote the acceptability of carp as a foodfish, in markets dominated by marine fish produce. This goal may be realized with NIFTC's proposal to integrate value-added carp-based production development in collaboration with the postharvest technology division of BFAR. Carp is very good for surimi products, Ms. Palma noted.

Carp is 12% of the national freshwater fish production as reported by the Bureau of Agricultural Statistics (BAS), the NIFTC Chief noted. But this figure could be misleading, she said. "Twenty per cent would be nearer the actual production." She added that the discrepancy must be because different areas have different local names for carp—bighead, Imelda and mamalig are carps. She has asked BAS to review its recorded data and reconcile its statistics with current production.

Carp fisheries development that NIFTC looks forward to in the future is land-based: polyculture and integrated farming. The first-ever NIFTC nationally conducted training on carp-based integrated farming is slated this October. "The integrated approach would be a very sound

development," she said, noting that it is the Center's next step after carp hatchery and culture technology transfer; and that it meets the government's goals of food sufficiency and sustainable aquaculture development.

When asked for her concluding remarks, Chief Palma said: "Considering the low production of carp and high production turn-out for culture, and if we're trying to develop an alternative species geared towards attaining food sufficiency at the same time preserving the environment, I think we can always look up to carp as an alternative species—*Carpa para sa Masa*, Carp for the Masses." ###

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What kind of carp culture developments would you like to see in the future?

Engr. Aralar: Increase in the survival rate of larvae. It is very low right now. We consider 60% already very high. Hatching rate depends on water quality management, it varies from about 60 to 80%.

Dr. Santiago: I'd like to see people work/further developments on the broodstocks' consistent reproductive performance.

What direction will the future take?

Dr. Santiago: Broodstock development rather than hatchery operations.

Has carp hatchery technology reached its fullest potential?

Dr. Santiago: There's still much room for growth, especially in landlocked areas—those areas which cannot be supplied by marine fish, like some areas in Mindanao.

Any parting words for our readers?

Dr. Santiago: I would just like to reiterate that if you go into carp culture, you will be supporting the country's food security program. I'd like to assure you that there is money in carp culture.

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he has done, is finding out what causes some fish ailments—gas bubbles, deformities—and eliminating these. The methods are his trade secrets.

He does not plan to expand into value-added products in the future yet. What he envisioned is the acquisition and setting up of a 20-ha fish pen for broodstock and grow-out operations. Currently, he has a 50% share of a grow-out pond in Sta. Maria, Laguna. He sells his grow-out produce at P25 per kg. These are marketed at the Binangonan and Malabon markets, where he said, "kahit ilang tonelada, ubos lahat" (even tons and tons of fish will all be sold out).

Aralar plans to increase their family's current stock of 1,000 broodstock. That is by purchasing breeders whose prices range from as low as P300 to P800. By doubling the capacity of his hatching jars to accommodate 7 million fry per run, he believes he can fill in the current 30% deficit in fry supply.

Living conditions is his barangay which he estimates has around 2,000-3,000 families have improved; and this prosperity he attributes to carp.

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