

# AQUACULTURE IN CUBA

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Fishermen on a freshwater reservoir



Fishermen hauling in a catch of Chinese carps



Fish farm with raceway basins



Co-author Pedro V. Batista in front of basins with harvest of African catfish

The history and present situation of aquaculture in Cuba are described. The production of shrimp post-larvae that takes place in Yaguanabo Shrimp Hatchery is described in more detail.

## History

Aquaculture in Cuba started in the 1920's with the introduction of common carp (*Cyprinus carpio*) and mirror carp (*C. carpio var specularis*) from the USA. In the decades that followed also native species were tested for their suitability for aquaculture purposes but none of the species tested had satisfactory growth or reproduced easily in captivity. Aquaculture development accelerated in the 1960's when bighead, silver and grass carps were introduced from the USSR. In the same decade Mozambique, red-breasted and blue tilapia were imported from Mexico. All these species were reproduced in several hatcheries and fingerlings were stocked in lakes and in the increasing number of freshwater reservoirs that were developed in the country for the irrigation of agricultural crops. The capture of the market-size Chinese and common carps and other fish from the lakes and reservoirs was (and still is) done by fishery enterprises that are supervised by the state. For two decades aquaculture served mainly to enhance freshwater fish stocks, resulting in a production of approximately 10,000 tonnes of fish per year. In the 1980's Nile tilapia and red tilapia were imported from Mexico and Israel respectively. In 2000 African catfish *Clarias gariepinus* was imported from Malaysia. The latter three species are grown in more intensive culture systems (ponds, concrete basins). Total freshwater fish production from culture and enhanced fisheries has increased and reached nearly 23,000 tonnes/year.

Mariculture started in the 1980's but its development took off in the 1990's with the development of shrimp production. Reproduction, production of post-larvae and outgrow to market-size shrimp takes place in 7 farms. Total shrimp production reached 6285 metric tonnes in 2018.

## State enterprise activity

Nearly all aquaculture activities in Cuba are undertaken by 15 state enterprises. These enterprises take care of production, processing, distribution and marketing and are united in the 'Grupo Empresarial de la Industria Alimentaria' (GEIA) which is part of Ministry of the Alimentary Industry (MINAL). This ministry dictates the strategic orientation of all aquaculture activities and is responsible for the introduction and control of new technologies and species. There is only one private farm growing African catfish, but the number is expected to increase in the near future.

## Freshwater aquaculture: present situation

Although intensive and semi-intensive culture systems are increasing in number and importance, the extensive production from enhanced fisheries taking place in the 473 reservoirs (total surface 124,000 ha) still contributes 70% of Cuba's total freshwater fish production. Seventy-five % of the extensive production from reservoirs consists of Chinese carps, the other part consists of tilapia. The fish are caught by 1833 inland



Yaguanabo Shrimp hatchery with ponds for broodstock in front and in-door facilities for reproduction, larvae rearing and algae rearing at the back



Female shrimp with sperm package



The production manager of Yaguanabo Shrimp Hatchery, Héctor Cabrera Alarcón, showing the youngest life stages of the shrimp

fishermen who use over 1200 vessels and serve the domestic fish consumption. The reservoirs are regularly stocked with fingerlings that are produced in 26 fingerling production units that are spread over the country. Long periods of droughts and hurricanes that recently seem to occur more frequently are the biggest challenges to this sub-sector.

Twelve factories process all carps into coquettes, sausages, mince and canned fish and supply restaurants and canteens of state-owned factories, schools and hospitals.

Tilapia and African catfish are produced in semi-intensive and intensive culture systems (concrete basins, ponds, cages) in 7 tilapia and 29 catfish farms. These farms produced 1500 tons of tilapia and 5700 tonnes of catfish in 2018. The production is consumed mostly as filets in the domestic market.

### Marine aquaculture: present situation

Shrimp culture in Cuba was developed in the 1990's with the native Southern white shrimp *Litopenaeus schmitti*. Around 2004 the country shifted to Pacific white shrimp *Litopenaeus vannamei* which is now the only shrimp species produced. Production and marketing is in the hands of the state-owned Shrimp Farming Enterprise (ECCAM), which employs 1800 staff and labourers. Production of market-size shrimp takes place in 5 state-owned farms that are located at Cuba's southern coast (which is less prone to the impact of storms than the country's northern coast). The largest farm, called Camaronera del Litoral Sur (CALISUR), covers 957 hectares. This farm had a total yield of 2620 tonnes in 2018, realised in 100 ponds and 2.8 culture cycles per year. Of the country's total shrimp production (6285 tonnes in 2018) 5000 tonnes was exported, mainly to France, Italy, Spain and Belgium, earning much-needed foreign currency for the Cuban government. The remaining part was mainly consumed in the hotels and restaurants catering to the tourists.

The relative isolation under which Cuban shrimp culture has developed (result of the long economic embargo by the USA) has also prevented the introduction and occurrence of the (viral) diseases that have impacted shrimp farming in most other parts of the world. Only the opportunistic *Vibrio* bacteria affect the culture. Diseases problems are addressed with probiotics; antibiotics are not used. For several years already, the development of the Cuban shrimp sector is supported by the University of Ghent. Belgium researchers regularly visit Cuba and Cuban researchers study in Ghent. The dynamics of bacterial populations in the water (pre- and probiotics) and how these can be manipulated to enhance

the health of shrimps are important research topics in this collaboration project.

### Production of post larvae

In May 2019 we had to privilege to visit Cuba's only shrimp nauplii production facility called Yaguanabo Shrimp Hatchery, located in Yaguanabo beach (province Cienfuegos) at Cuba's southern coast. Hatchery production manager Mr Héctor Cabrera Alarcón showed us around and enthusiastically explained each step of the reproduction and larvae rearing process. The hatchery was built in 1993. It consists of 14 large outdoor ponds for brood stock (photo ...). Several large halls contain a multitude of mating and spawning tanks, algae tanks, larvae rearing tanks, laboratories, etc. Over 100 staff members and labourers are employed at this facility. Hygiene protocols for visitors are strict: the wearing of protective clothing and boots is obliged, at the entrance of each building hands must be washed and disinfected, boots have to be dipped often in shallow baths with disinfectant.

Shrimp broodstock are selected at the age of 2 months; batches of several thousand shrimp are raised in outdoor ponds and fed with squid, bivalves, adult *Artemia* and pellets until the age of 8 months. Then batches of 60 females and 60 males are selected and placed together in 8 m<sup>3</sup> indoor oval tanks. Mating is stimulated with manipulation of light intensity and light duration. Eyestalk ablation is not applied. While in the mating tanks, the female shrimp are scooped out and checked frequently for the presence of sperm packages (photo ...). When a sperm package is detected the female is separated in a smaller tank and kept without any disturbance until she has spawned. Eggs are collected and transferred to hatching tanks. The youngest stage (zoea) are initially fed with two species of diatoms and omega-3 enriched *artemia* nauplii. When the shrimp larvae grow bigger also the older stages of *artemia* (mysis) are fed. Annual production of Yaguanabo hatchery is between 1 and 1.2 billion shrimp nauplii. Five hundred to 600 million nauplii are raised to PLs on location, the other part is transported to a facility called Manzanillo in Granma province for on-growing to post-larvae size. All post-larvae are distributed among the five shrimp grow-out farms elsewhere along Cuba's southern coast. Average market size is 14 gr/piece.

### Acknowledgements

We would like to thank Empresa Pesquera de Granma (PESCAGRAM) and Empresa para el Cultivo del Camarón (ECCAM) for making valuable information available to the authors.