# Leopard coral grouper larval rearing at Nha Trang

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Abstract

9000 individuals of Leopard coral grouper larvae, TL30mm, were cultured from eggs on MRDC-RIA3.at Nha Trang, at first time in Vietnam. Leopard coral grouper、***Plectropomus leopardus***, is one of the most valuable tropical marine aquaculture fish, and many farmers have been looking forwards to supply this larva for aquaculture.

Three larval rearing has been succeeds from 28th March to 5TH June 2007 on 5kl tank in indoor at. Marinculture Research and Development Center-Research Institute for Aquaculture N.3,

The eggs, its diameter 0.85mm, were spawned naturally from 18:00 to 19:00 in 100kl tank, and they were hatched out in 23hr after spawning at 27℃ and the hatched larval length was 1.8mm. The larvae opened their mouth in 36hr after hatching, and started to take their first feeding in 44hr after hatching at 27℃.

The larvae grow to 4mm TL at 10days after hatching (dha), 8mm TL at 20 dha, 20mm TL at 45 dha and 35mm TL at 55 dha. The size difference was enlarged from 30 dha, and the larvae started their cannibalism from 20mm TL. The survival rates of three rearing were 0.4 to 2.7% during 40days culture. The big mortality of three rearing occurred during the first ten days of culture period.

The water temperature showed from 26.9 to 28.8℃ and ph of the water showed from 7.7 to 8.0. during their culture,

This successful of rearing depended on the good control of water movement from hatching time to first feeding time, and the supply of many baby Rotifera, first live foods for larvae, by high density, and the supply of enriched foods, etc.

This work has worked under the technical transfer of marine fish culture by JICA, Japan International Cooperation Agency.

Background

Marine finfish aquaculture is an important contributor to the economies of coastal communities in Vietnam. Aquaculture of high-value marine finfish species continues to develop rapidly in Southeast Asia.

Many grouper (members of the Family Serranidae) bring high price in living in Southeast Asia. The limited availability is of fingerlings is one big problem for development of grouper aquaculture. Grouper aquaculture remains heavily depend on the capture and grow-out of wild-caught juvenile fish. The trade in wild fry is associated with a number of resources management issues including overfishing, use unsustainable harvest techniques, high level mortality. To meet aquaculture's demand for seedstock and to reduce pressure on wild fisheries, there is a recognized need to development the rearing of groper larvae form eggs.

Leopard coral grouper、***Plectropomus leopardu***、 is the most valuable species in grouper at Southeast Asia. They grew to 70cm total length. They distributes from Okinawa, Taiwan, Vietnam, West-pacific, Australia. At Nha trang Leopard coral grouper has been culturing with wild fry in several cages.

Marinculture Research and Development Center-Research Institute for Aquaculture N.3(MRDC-RIA3) at Nha Trang Vietnam has been studying the development Leopard coral grouper larval rearing from 2004 on the cooperation with Japan International cooperation Agency(JICA). In June 2007 MRDC had first rearing larvae from eggs. This article are descried of rearing for Leopard coral grouper larvae at Nha Trang

Material and methods

Used eggs were collected from natural spawned eggs with cultured bloodstocks in 1000kl tank at MRDC from March to May. Larval rearing used 5kl capacity concrete tank, 5m diameter and 2m depth, until 40days from begin in indoor of MRDC. Rearing sea water was treated with sand filter and Ultraviolet.

Air was supplied from the middle of the tank to move the current of rearing water. The rearing water changed increasingly from 10days after begin. The bottom and wall of tank was cleaned up by the siphon every two days until 14day after hatching (dha) , and everyday from the late periods. The dirt at the surface of rearing water was taken by surface cleaner with air. Water temperature and ph of rearing water were measured every morning.

Nanocrollopsis, phytoplankton was put into rearing water until 30dha to keep the condition of the rearing water and food for Rotife.

Alive food, Rotifera, Artemia, and artificial food were feed to larvae. Alive food were enriched UFA by CERCO for six hours before feeding.

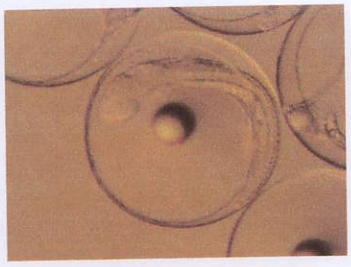
The number of rearing individual was estimated by night sampling with 4 points in tank with plastic pipe, 40mm diameter and 2m length.

After 40 dha, 2kl capacity plastic tank was used for culturing larvae with running water.

Results

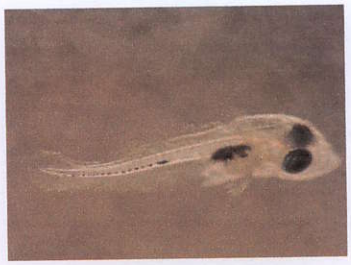
Early stage

The eggs, it's diameter 0.85mm, were spawned naturally form 18:00 to 19:00 from February to June in 1000kl tank at MRDC-RIA3, and the water temperature during the spawning period were from 24℃ to 29℃。 The eggs were transfer form the collecting net to 500l conic plastic tank. Fertilized eggs were floated at the surface of stilled water in that tank, and they were collected with a hand-net and put into 5kl rearing tank. The eggs were hatched out in 23hr after spawning. Newly hatched larvae drafted at surface in short time and they made to settle slowly to the bottom with vertically style, so the larvae were kept to float by the current movement of rearing water with aeration. The larvae started their swimming with opened their mouth and pigmented black eyes in 36hr after hatching, and begin to take first foods at 44hr after hatching. The yolk and oil grove of larvae were disappeared at 6 days after hatching without food.



Eggs, 0.18mm

Hatched larvae 1.8mmTL



Postlarva 2.5mmTL

Rearing environment

The water temperature showed from 26.9 to 28.8℃ and ph showed from 7.7 to 8.0 during larvae rearing periods as showed table.

**Table 2. Some environment factors during rearing.**

| Date (old day) | Temperature ($^0$C) | DO (mg/L) | pH |
|---|---|---|---|
| 28/03-06/04 (1-10) | 26,9 – 27,5 / 27,15 | 4,38 – 5,5 | 7,7 – 8,1 |
| 02/04-16/04 (11-20) | 27,2 – 27,8 / 27,42 | 4,39 – 5,3 | 7,6 – 8,0 |
| 17/04-26/04 (21-30) | 27,9 – 28,2 / 28,01 | 4,42 – 5,3 | 7,7 – 7,9 |
| 27/04-05/05 (31-40) | 27,5 – 28,5 / 27,97 | 4,39 – 5,4 | 7,7 – 8,0 |
| 06/05-15/05 (41-50) | 28 – 28,5 / 28,2 | 4,48 – 5,38 | 7,6 – 7,9 |
| 16/05-20/05 (51-55) | 28 – 28,8 / 28,44 | 4,5 – 5,4 | 7,7 – 7,9 |
| | | | |
| | salnility (ppt) | 34 - 35 | |

Feeding regime

At the larvae begin to take first foods at 44hr after hatching, Rotifer were feed to larvae on density 30-35ind/ml in the rearing water at three times/day, and from 6dha to 30dha the density of rotifer was maintained on 10-20ind/ml. Artemia nauplius were feed to larvae when the larvae grow over 5-6mm TL. The feeding amount of Altemia were keep to being adjusted to the level that larvae can consume all Artemia supplied into the larval rearing tank with one hours to prevent consequently nutrition deficiency. Artemia were feed at five times/day. Rotifer and Artemia nauplius were enriched by DHA SELCO for six hours before feeding. Artificial food, INVE pellet micro-artificial feed, were made larvae familiar from 15dha, and almost larvae feed the artificial food from 15mm TL.

**Table 1. Feeding regime**

| Old day | Feed | Feeding desity (ind/mL) | Feeding times/day |
|---|---|---|---|
| 1 - 2 | | | |
| 2 - 15 | Rotifer | 25 - 30 | 3 |
| 15 - 30 | Rotifer | 10 - 20 | 2 |
| | Nau-Artemia | 0,5 - 2 | 5 |
| | Artificial food | | 3 |
| 30 - 45 | Nau-Artemia | 2 | 2 |
| | Artificial food | | 5-6 |

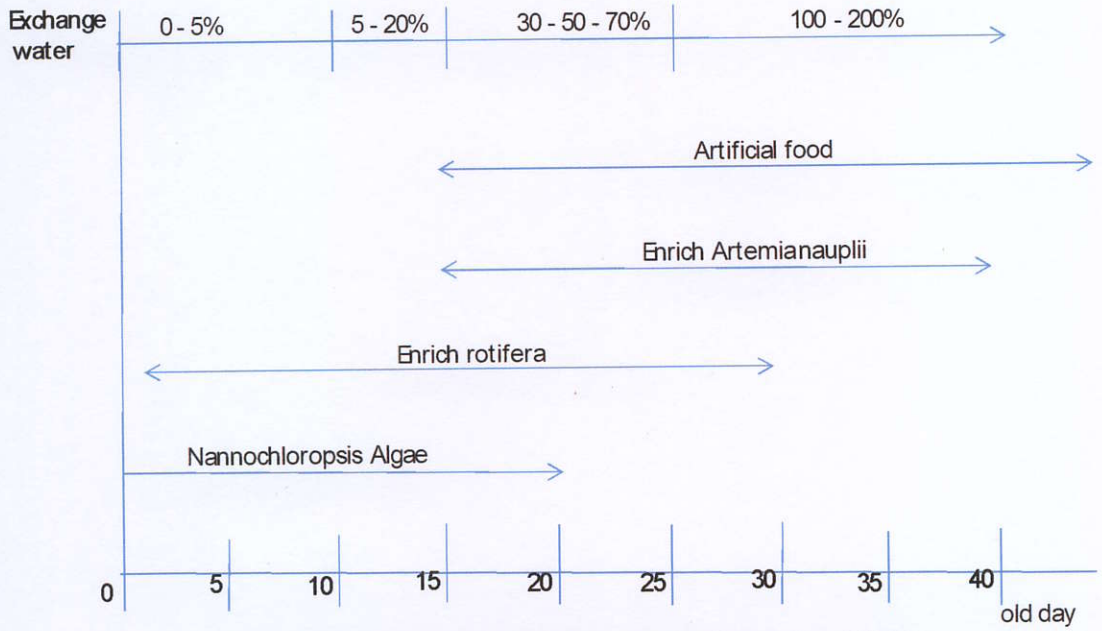



**Fig1. Abstract Processrearing of *Plectropomusleopardus* at MRDC.**

The rearing water was not changed replacing only adding more water until 10dha. From 10day, the water was changed from 10% to 50% of the volume, and the water flow was set up in and out recirculation at lightly rate from 20dha.

Larval growth

The length of hatched out larva was 1.8mmTL, and they grow to 2.3mm when they started feeding. The pelavic fin spine and the 2nd spine of the dorsal fin emerged on 7dha (days after hatching) 3.0mmTL larva. The larvae grow to 4mmTL at 10dha, and 5mmTL at 13dha with elongated pelavic fin spine and the 2nd spine of the dorsal fin. The larva reached 7mmTL at 17dha with developed both fin, and its caudal fin had developed. At 45 dha, the majority of larvae with 20mmTL remained translucent. The larva reached 35mm TL at 55 dha, its body had become red and serrations on the dorsal, pelavic, and anal fin spines reduced. The size difference was enlarged from 30 dha, and the larvae started their cannibalism from 20mm TL.

**Table 3. Total length of laval and juvenile Plectroponus *leopardus* .**

| Old day | Min - max (mm) | Average length (mm) |
|---|---|---|
| 1 | 2,0 – 2,6 | 2,3 ± 0,2 |
| 10 | 3,5 – 5,7 | 5,1 ± 0,4 |
| 20 | 6,3 – 10,2 | 7,9 ± 1,4 |
| 30 | 8,4 – 20,8 | 11,1 ± 2,3 |
| 40 | 8 – 22 | 17,1 ± 4,2 |
| 50 | 17 – 32 | 27,7 ± 3,4 |
| 55 | 19 - 42 | 30,3 ± 5,5 |

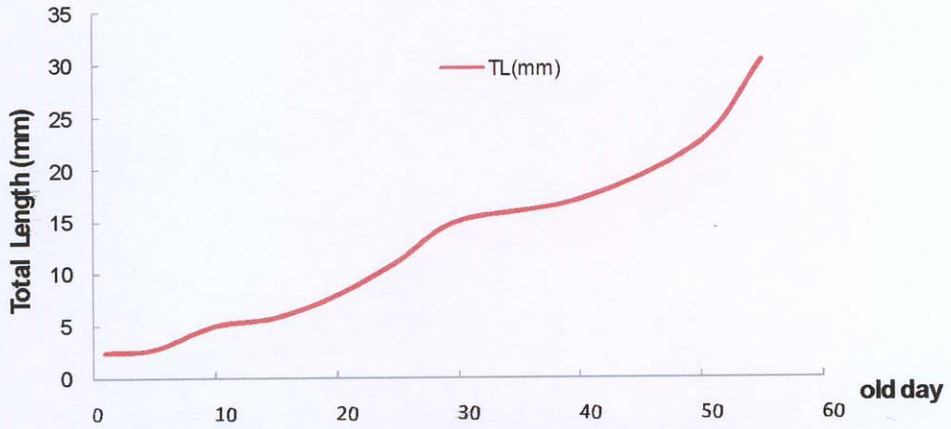



**Fig4. Growth during rearing of *Plectropomus leopardus*.**

Postlarva 7dha TL3mm

Postlarva 10dha TL4mm

Postlarva 13dha TL5mm

Postlarva 17dha TL7mm

Juvenile 45dha 19mm

Juvenile 55dha 35mm

Survival of rearing

The early survival rates from hatching to the first feeding of three rearing were almost over 90%. Then, the survival rate dropped extremely until 10days after hatching (dha), and they showed 34% and 28% of survival rate at 1st and 2nd rearing on 6dha. After 10dha, there were not occurred the big mortality of larvae until the larvae started their cannibalism from 20mm TL.

**Table 4. Result & survival rate laval rearing of *Plectropomus leopardus* in 40 old days.**

| Tank | V ($m^3$) | Number of lavae (individual) | Stocking density (ind/L) | Rearing time | Number of juvenile (individual) | Survival rate (%) |
|---|---|---|---|---|---|---|
| 23 | 5 | 245000 | 81 | 28/03 – 03/05 | 6500 | 2,65 |
| 22 | 5 | 392000 | 130 | 27/03 – 03/05 | 1500 | 0,38 |
| 20 | 5 | 180000 | 50 | 26/04 – 05/06 | 750 | 0.42 |

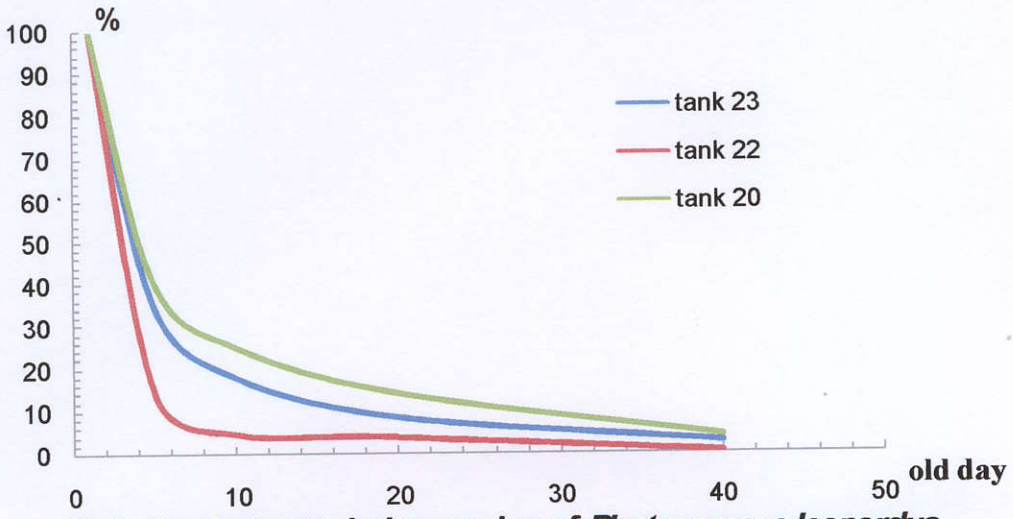



**Fig6. Survival rate during rearing of *Plectropomus leopardus*.**

Discussion

9000 individuals of Leopard coral grouper larvae TL30mm、***Plectropomus leopardu***、were cultured from eggs. Grouper larvae culture has yet several problems to get the high survival rate to compare to other tropical marine fish. The reasons of hard culture are their small egg size and their specific behavior with their characteristic morphology. To succeed for first feeding, we feed Rotifer at high density to supply enough Rotifer to larvae. And to get high survival in early stage, the early larvae were kept to float by the current movement of rearing water with aeration. But, the following days until 10day after hatching (dha), the survival rate dropped extremely. We need to study more for this period. The cause of big mortality in this period has several factors, egg quality, environment factor, and disease. For getting good quality eggs, we need to study more for good management of broodstocks. And for the environment problem some informed to need the optimum light condition, lighting during night time and keeping low illumination for early period with cutting big illumination change. And for disease problem, groper fish culture needs to over VNN VIRUS disease.

This work is the first step to development Leopard coral grouper larvae culture in Vietnam. The study worked under the technical transfer of marine fish culture by JICA, Japan International Cooperation Agency.

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Reference

・Embryonic and Morphologic Development of Larval and Juvenile Coral Trout ***Plectropomus leopardu***、 S.Masima, N.Teruya and K.Tezuka, Japan J. Ichtyol. 40(3) 333-342, 1993

・.Manual for Seed production of Humper Grouper, ***Cromiletes altivelis,***
K.Suganuma, T.B.Slamet etc. Gondol Reseach Institute fo Mariculture-JICA 2001