

## Biology of *Macrobrachium rosenbergii* Distribution

There are 150 species of *Macrobrachium* in the world of which 49 are commercial. Twenty-seven of the commercial species are found in Asia and the Pacific. Most live in freshwater a few species live in brackishwater in the mouth of rivers. *M. rosenbergii* is found in the tropical and sub-tropical waters in the Indo-Pacific region in Malaysia, Thailand, the Philippines, India, Sri Lanka, Bangladesh, Myanmar, Indonesia and Vietnam. They are generally found in freshwater ponds, rivers, lakes, ditches, canals, depressions, low lying flood plains and river mouths.

Prawns move upstream, entering lakes and even paddy fields, up to about 200km from the sea. This type of migration is observed not only in *M. rosenbergii*, but also in other species of *Macrobrachium*.

## Morphological Characteristics and Habits

*Macrobrachium rosenbergii* is an invertebrate with exoskeleton or shell. The body of a prawn is composed of three parts: head, abdomen and tail. There are five pair of walking legs at the head part. The first pair is used in putting food into the mouth. The second pair is much larger than the others and ends in pronounced claws. It is used for self defense and catching food. The rostrum develops at the tip of the head. Dorsal and ventral rostrum teeth number 12 to 15 and 8-14 respectively. There are five pair of swimming legs at the abdomen with one pair at each abdominal somite except the last one. The tail part is composed of two uropods and one telson.

**Table 1. Characteristics of Male and Female Freshwater Prawn**

Male	Female
Size: larger 2 <sup>nd</sup> walking leg: larger head: proportionally bigger genital pores: between the bases of the 5 <sup>th</sup> pair of walking legs	Abdomen: larger gravid females can be easily distinguished

**Table 2. Identifying characteristics of Freshwater Prawn & Marine Shrimp**

Freshwater Prawn	Marine Shrimp
second abdominal pleuron overlaps the first and third pleura	second pleuron overlaps only the third pleuron and is itself overlap by the first.

## Identifying Characteristics

- The carpus of the pereopods is longer than the merus.
- The second pair of pereopods in the male is thicker than in other species.
- There are 13 teeth in the lower part of the rostrum.
- The rostrum is long and slightly bends upward.
- Telson extends up to the end of the uropods
- Older *M. rosenbergii* juveniles and the adults are normally distinctively blue in color.
- Occasionally they are brownish with orange stripes.

Giant freshwater prawns are nocturnal, omnivorous and benthic feeders. Prawns are nibblers and slow feeders. They take the feed with twin pinchers and bring them to their mouth and slowly chew on them. Their diets include zooplankton, aquatic animals, small molluscs, crustaceans, algae and organic material, both of animals and vegetables. They are cannibalistic especially during molting. Prawn seeks food at night and hide during daytime.

*Macrobrachium rosenbergii* grows fast, can tolerate moderate temperature and salinity changes and can be cultured in ponds. Dr. S.W. Ling, pioneered the closing of cycle of this species in 1961, that larvae completed its phase in brackishwater.

**Table 3. Subspecies of *M. rosenbergii***

Species	Characterization
Blueclaw subspecies	- subspecies grows to a large size - male is territorial - breeding behaviour is complex - growth is comparatively slow.
Orange claw subspecies	- Little bigger than the median size of the blueclaw variety - has orange coloured claws - rate of fertilization of eggs is comparatively slow, but growth is fast.
Small subspecies	- with spineless claws. - ratio of claw to body length is 0.5 - time of copulation, these adopt the "snake" mating strategy - growth is slowest of these varieties.

There are four stages in the life of a freshwater prawn namely:



## Broodstock Distribution in the Philippines

The Giant freshwater prawn, *Macrobrachium rosenbergii*, grows to a large size in the Indo-Pacific region and is a popular aquatic food in Asian countries, in Europe and North America.

Giant freshwater prawn brood-stocks can be obtained from lakes, rivers, tributaries and other freshwater bodies and caught by indigenous fish traps. *Macrobrachium rosenbergii* was reported to abound in the Ilocos, Cagayan, Pangasinan, Pampanga, Bulacan, Laguna, Palawan, Bicol Region, Leyte, Samar, Cotabato, Lanao Provinces, Maguindanao, Agusan Provinces and some areas in Mindanao.

## Hatchery Site Selection

### Factors to be considered are:

- ground water quality
  - access to brine
  - availability of electricity
  - adequacy of drainage
  - availability of skilled labor.
- **Water supply.** The success of hatchery rests on water quality. Under ground water is the best in hatchery use.
    - The pH should be 7.0-8.5. No hydrogen sulfide (H<sub>2</sub>S).
    - Susceptible to nitrate and nitrite
    - Sublethal level of nitrite - 1.8 ppm (NO<sub>2</sub>-N)
    - Intake water not have higher than 0.1 ppm (NO<sub>2</sub>-N) and 20ppm NO<sub>3</sub>-N)
    - The total hardness should be less than 100 ppm (CaCO<sub>3</sub>). The nitrate/nitrite level should be 20 ppm or 0.10 ppm, respectively.
  - **Other site selection criteria**
    - **Electrical power supply should be 3 phase – 220 V** and supply is reliable throughout. A generator/diesel engine for the air blower is necessary to cope with power failures. There should be a good road network for transport of brine, materials and post larvae throughout the year. The site of hatchery should be near freshwater fishponds for broodstock supply and wastewater should be provided, but drains should not discharge into paddy or other cropland.

## Breeding

### Larval Density

- A berried female prawn usually produces 1,000 larvae per gram.
- 4 berried females can be stocked for 2 meters square
- Stocking density in f tanks ranges from 30-50 larvae per liter to 100 larvae per liter (intensive)<sup>1</sup>

### Larval Rearing Requirements

- **Salinity**
- The larval rearing salinity, should be 12 ppt  $\pm$  2 ppt. Salinity can be checked by hand refractometer
- **Temperature**
- The ideal temperature for rearing is 28-30 °C. It has to be born in mind that temperature below 24 °C and above 33 °C are lethal to larvae. Fluctuations of temperature by more than 1 °C are stressful and cause mortality.
- **Dissolved Oxygen**
- There should be sufficient aeration in the larval rearing tanks. An air blower is prepared with greater volume of oxygen.

Larval rearing water exchange in tanks at 200 percent per week and must be aerated. Density of 5000 PL per m<sup>2</sup> (one week) and 1000 to 2000 PL per m<sup>2</sup> after one month in rearing tanks.

### Broodstock and Spawning Tank Management

To get enough quality eggs, careful management of broodstock is required.

- Orange color – eggs will hatch within 21 days.
- Usually grey or black color – eggs will hatch within 2-3 days
- Larvae should have same age to avoid cannibalism
- Disinfection of berried females with 25 ppm formalin for 90 min in aerated water is usually practice in hatcheries
- Eggs can be hatched in freshwater then raise to required salinity of 12 ppt.
- Berried females should be selected carefully.

Applying the following criteria they should be:

- Healthy and disease free
- Strong and active
- Bright coloured
- Laden with large number of eggs

### Routinary Water Quality Maintenance in the Hatchery

Cleanliness must be strictly maintained to ensure best results. Constant vigilance is required to prevent and control outbreak of diseases.

The following precautions should be taken.

- a. Larvae should not be given feed in excess of their requirements. (10 artemia nauplii per mL or 10,000 nauplii per liter per day)
- b. The walls of the tank should be cleaned with a soft brush every third day
- c. Solid waste and dead larvae should be removed by siphoning. Aeration should be turned off at this period and turned on immediately thereafter.
- d. A water exchange of 50 percent is needed to be exchanged daily. In a recirculating system a 20 percent replacement on day 10 and on day 20 is beneficial.
- e. After completing a larvae rearing cycle, the side walls of the tank should be brushed well and kept moist for 24 hours with a strong solution of commercial bleaching powder. Formalin at 250 ppm may be used in place of bleaching powder.
- f. If condition of water deteriorates, or the movements of larvae become weak, then 100 percent of the rearing water should be changed.

### Feeds and Feeding

Prawn larvae feed by filtering particulate matter. Food particles must be small enough to enter their mouth, yet large enough to be retained by their setae.

Larvae in the first stage do not actively search for food. Artemia's density must be high enough so that larvae will frequently encounter their food. Late stage larvae and post larvae are more active in searching for food.

To prepare food for larvae, the following should be remembered.

- The feed has to contain components, which attract larvae.
- Feed quality is paramount importance.
- Feed should be hygienically prepared/stored.
- Prepared feed should remain in suspension in the water.
- The particle size of the feed should suit the requests of each stage of the larvae.

For more information please call or write to:

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## Biology and Hatchery Management of the Giant Freshwater Prawn

### *Macrobrachium rosenbergii* - de Man

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