INTERNATIONAL TRAINING PROGRAMME

AQUACULTURE MANAGEMENT COURSE

(PRAWNS)

AQUACULTURE DEPARTMENT

S.E.A.F.D.E.C.

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

TIGBAUAN ILOILO CITY , PHILIPINES

FOREWORD

This paper is written specially for the fisheries laboratory staff in Apia. It mostly cover the majority of the topics which have been discussed in the course which held in e Philipines from August to October 1980.

Special thanks for Alfonso Philipp, Chief Fisheries Officer of the Fisheries Division in Apia for trying to push me through this course.

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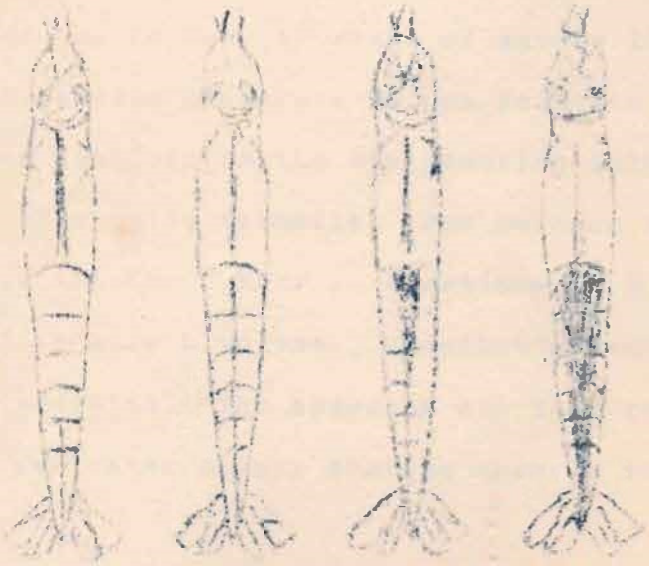
APPEARANCE OF OVARIAN MASS OF DIFFERENT

STAGES OF MATURITY

P. Monodon



1 2 3 4

1. IMMATURE STAGE

Ovaries are unpigmented, thin, translucent, and unconfined to the abdomen.

2. EARLY MATURING STAGE

Ovary is increase in size, and anterior and middle lobes are developing.

3. LATE MATURING STAGE

Ovary is light green and is visible through the exoskeleton and the anterior and middle lobes fully developed.

4. MATURE STAGE

Ovary is dark green ova are larger than in the preceding stage and is believed to be the last day of maturity and its ready for spawning.

DISINFECTION OF SPAWNERS

Spawners may carry infective agents which affect the eggs and the subsequent larval stages in the culture tanks. It is advisable to disinfect the spawners before they spawn. Disinfection may be done by means of agents like formalin or furance. Effective doses are 50 ppm formalin and 3 ppm furance. The spawners are left in the disinfecting solution for 15 to 20 minutes when using formalin. For furance spawners can be kept in solution for 1 hour . A maximum of 5 spawners may be disinfected in a 20 L volume. Aeration should be provided during disinfection. The spawners are then rinsed thoroughly with clean sea water before placing them in the spawning tank.

SPAWNING & HATCHING

After disinfection, spawners are placed in spawning tanks which may range from 100 to 300 L in volume. The water used for spawning should be clean to avoid infection of eggs. It would be better to place only one spawner in its spawning tank thus the fecundity and hatching rate of eggs per spawner can be determined. Eggs with hatching rates lower than 30% are not ideal for rearing. Gravid P. monodon normally spawns at night. The spawning tanks should be shield from light by means of black cloth or some other material that can provide the same effect. Aeration should be moderate and water temperature should be about 28^{o}C. A common evidence of spawning is the appearance of yellow orange scum on the water surface or attached to the walls of the tanks. Some spawners dont exude this yellow-orange so it is necessary to sample portion of water in transparent beakers on cups and to look for the eggs. The eggs hatched to nauplii 12 to 15 hrs after spawning. Not all eggs hatch at the same time to determine hatching rate, the count of nauplii may be made in the morning of the following day. Normally the hatching rates of eggs from good spawners range from 60-98%.

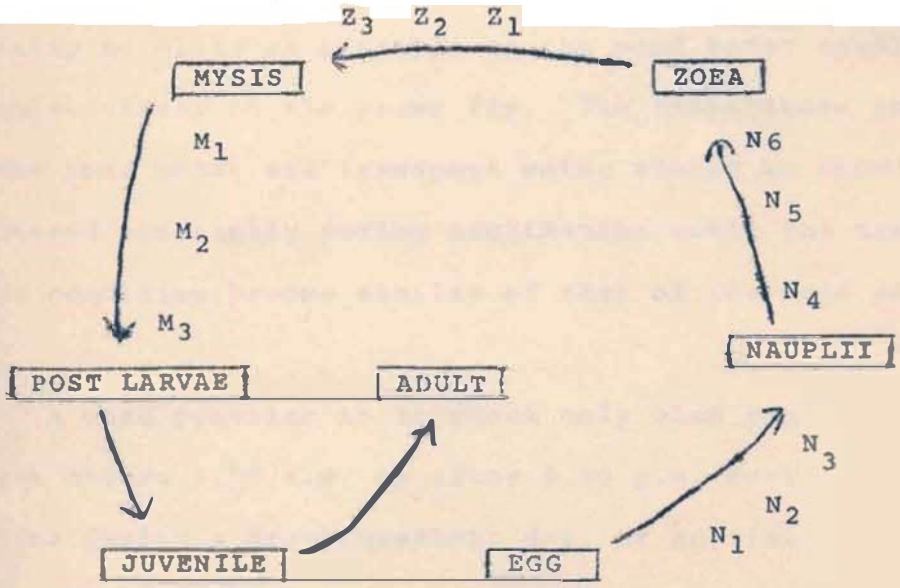
PREPARATION OF REARING TANKS

The tanks are scrubbed and rinsed with sea water, then dried for at least 2 days before they are used. This rids the tanks of harmful organisms and avoid possible pollution from decaying biota left during previous operation. Seawater is pumped and filtered through a vinylon cloth bag of 80 mesh per m^2 to remove coarse particles and avoid entry of predators.

REARING IN LARVAL CULTURE TANK

It is convient and less stressful to transfer them into the larval culture tank (2 - ton conical bottom tank) while still in N_4 substages. The larval culture tank may be stocked at initial densities ranging from 50,000 to 100,000 nauplii per ton. Higher stocking densities require more careful water management and more intensive diatom feeding. About 2 days after hatching, the nauplii metamorphose into zoeae and this is the stage when the larvae starts to feed. Water management in larval culture tank depends on several factors such as concentration of metabolites diatom density, occurrence of infection and amount of particulates. Water changing is done by using a strainer. After molting from nauplii the zoeae take about 5 to 6 days before molting to the mysis stage. Once the zoeae metamorphose into mysis one half to two-thirds of the water should be changed daily. The three mysis substage require about 4 to 5 days, after which the larvae became post larvae. Hatched brime shrimp on finely ground fish meat provide the major diet of the P. monodon in the early post larval stage (P_1-P_5). Algae are also supplied to help enhance water quality. The fry at P5 may already be harvested for stocking in nursery ponds. A larvae of P. monodon consumes about 50 nauplii per day.

LIFE CYCLE OF P. MONODON



HARVESTING TECHNIQUE

Harvesting is done by first draining out three-fourths of the volume of water in the tank. A strainer is used to prevent the fry from being drained out. The drain valve is then open slowly and the contents discharged into 150-L harvesting box. The upper one fourth portion of the walls of the harvesting box is fitted with plastic screen to allow the water to overflow while retaining the fry inside.

PRE-TREATMENT AND TRANSPORT

Before transport, the fry are first held at a temperature 5°C lower than the water temperature in the tank. This is done by introducing previously frozen sea water. The fry are held at this temperature for 30 to 60 mix. The temperature is further decrease to about 20°C before the fry are packed in 50 x 90 cm plastic bags. About 20,000 fry can be packed in one plastic bag containing 16 L of chilled sea water. The plastic bag container is pumped with oxygen and the mouth is firmly with rubber bands. The fry contained in bags are shipped in styrofoam boxes for stocking.

ACCLIMATION & STOCKING

The idea behind acclimation prior to stocking is to make the fry transport water condition in terms of temperature and salinity as close as possible to the pond water condition to minimise stress on the prawn fry. The temperature and salinity of the pond water and transport water should be known and monitored constantly during acclimation until the transport water condition become similar of that of the pond water.

A good practice is to stock only when pond water temperature is low before 9.00 a.m. or after 9.00 p.m. during sunny days, anytime during a heavy overcast day, or anytime when fresh tidal water come into the pond.

FOR FRY TRANSPORTED IN PLASTIC BAGS

i. Remove the plastic bags from the styrofoam containers.

ii. Allow the bags to float on the pond water for at least 30 minutes to equalize the temperature.

iii. Open one bag and take the water temperature with themormeter or by dipping the hand inside the bag.

iv. Take the pond water temperature.

v. If no difference is felt or if the termometer reading differes only within 1-2^{o}C proceed with the next stops. Otherwise introduce pond water gradually.

vi. If the difference in the salinity of the transport water and the pond water is known beforehand to be equal to or less 5 ppt, the fry can be released immediately once the temperature is equalized.

vii. If the salinity difference is great, enough pond water is introduce very gradually into the bag until the salinity difference is reduce to less than 5ppt. In the absence of a salinity measuring device, gradually diluting the transport water with pond water up to four times its original volume should be sufficient to bring the salinity difference down to acceptable limits.

Direct stocking of fry from the hatchery into earthern nursery pond after acclimation is recommenced.

NUTRITION AND FEEDING

The prawns required untrients such as

1. Protein
2. Fats
3. Carbohydrates
4. Minerals
5. Vitamins

Protein source feed is very expensive.

ANIMAL PROTEIN SOURCE

1. Fish meat
2. Shrimp head meal
3. Chicken entrials
4. Feather meal

For juveniles they required 35 - 45 of protein diet, and 3-5% of fat diets.

VEGESTABLE PROTEIN SOURCE

1. Soy bean meal
2. Cotton seed meal
3. Copra meal
4. Red palm oil residue
5. Ipil-Ipil (Leucaena leucocephala)

FATS SOURCE

1. Animal tallow
2. Pork fat
3. Corn Oil
4. Peanut oil
5. Coconut oil

CHO SOURCE

1. Flour
2. Corn meal
3. Rice bran
4. Cassava meal
5. Corn starch
6. Sago palm starch

TYPES OF PRAWN FEED

(i) Natural food such as pond grown lab lab (Algae) and planktonic organism.

(ii) Wet unprocessed material like mussel meal, trash fish cattle hide, entrials, etc. Wet materials can be used as full diet at high densities and best can be used only in extensive culture at low densities to to supplement the natural food.

(iii) Dry pelletized feed.

During feeding it is recommended to throw the pellets near the dikes so that they will get used to it.

FEEDING FREQUENCY AND METHOD

(i) In the nursery divide the daily ration into 3 to 4 lots and feed 3 to 4 times a day. As the prawns increase in size the feeding can be reduce to twice daily.

(ii) In the grow out ponds, the daily ration is introduced in two lots, one in the early morning and the second in the late afternoon.

(iii) The feed should be scattered all around the ponds along the periphery, but not too close to the dike.

HARVEST

The Peneaus monodon can be ready for harvest after 4-5 months with average weight ranges from 35-70 g per head with an estimate of 15-30 prawns per kilo. It is better to harvest the stock on three successive days or nights by means of shrimp traps, bagnet, or catching pond method. There should be immediate refilling of the pond if the bagnet and catching pond methods are used.

On the fourth day, complete harvest by reducing water to the level of the peripheral canal and hand picking remaining prawns.

PROCESSING AND TRANSPORT

The following steps should in the shortest possible time with great care and minimum handling to lessen spoilage and preserve quality.

(1) Immediately after harvesting, sort according to size. If for export, follow standard sizes and remove heads to reduce bacterial count, discolorations and storage space requirements. Beheading at the harvest site is preferable because it reduces the amount of ice needed. Heads can be fed to the prawns in other ponds.

(2) 1 ce in ic with close cont ct pro id by thin lt rnat layers of ice nd prawn . M x mu d pth of ice and prawns in cont in r sho ld not be more than 2-3 feet (60-90 c) to prevent bruising of botto lay rs.

(3) Transport containers to open markets or super markets for local consumption or a processing plant for further treatment if for export purposes.

DIESEASES

(i) The most important micro organisms that cause disease in pond - reared sugpo are chitinvorous bacteria that feed on the exoskeleton and ectocommensal protozoa that attach to surface including gills. If the latter are abundant on gill filaments they decrease oxygen uptake and gradually weaken the prawns.

(ii) Diseased prawns are characterized by the following:-

A. Blackening of the areas of the exoskeleton

B. Falling off parts of the walking legs and breaks in the uropods and other exoskeletal parts.

C. Dull luster of the exoskeleton.

D. Sluggish behaviour.

(iii) Prevention of disease may be accomplished by

(A) frequent change of pond water.

(B) not over feeding, excess food accumulates and decomposes on the pond bottom providing a favourable habitat for micro organisms.

DECAPSULATION OF ARTEMIA CYST

It has been found that due to hard shell, or chorion of artemia cysts, depending on the strain or variety hatching time and procedure varies. Decapsutation has been made possible by a very simple process.

1. Hydrate the cyst in sea water or fresh water for one hour at a ratio of 1:12 (1 gram) cyst per 12 ml H_2O).

2. Add sodium hypochlorite (NaOCl) Expose the cyst to hypochlorite solution for not more than 13 minutes. Water bath it or place some ice cubes if temperature rises so that it will still maintain a temperature of 28°C. Observe the change of colour from brown to white to orange. An orange colour is an indication that they are already decapsulated.

3. After fifteen minutes, drain it in a fine mesh strainer and rinse it with water. Rinse it several times until there is no more smell of hypochlorite then dry it.

4. Incubate it in sea water for 24-28 hours in a lighted room. Put a few drops of antifoam (DOW CORNING BREWING AID No. 525) in to the cylinder to prevent foaming as foam will make the cysts float and stick to the sides of the container.

Sodium Hypochlorite is marketd as

1 - Purex

2 - Chlorox

3 - Sanichlor

ADVANTAGE OF DECAPSULATION

1. Disinfection of cyst.
2. Increase hatchability,
3. Increase energetic content.
4. No more separation of cyst at harvest
5. Direct food source for some predators

- saving on energy otherwise needed for hatching
- potential vatorisation of no hatchable cyst.

6. Lower treshold for light triggering of the cyst metabolism.