

# SEED PRODUCTION TECHNOLOGY FOR FIN FISH

(Seabass *Lates calcarifer*)



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# ASIAN SEABASS - BIOLOGY

**BREEDS IN SEA - LARVAE ARE  
DRIFTED TO COASTAL AND  
ESTUARINE AREAS**

**MALES MATURE AT 2-3 KG  
FEMALES MORE THAN 3 KG**

**PROTANDROUS  
HERMOPHRODITISM – MORE  
THAN 5-6KG . MANY FISHES  
CHANGE TO FEMALES**

**PROTRACTED SPAWNING HABIT  
EGGS RELEASED IN  
BATCHES – INDIVIDUAL CAN BE  
MADE TO SPAWN 6  
DAYS IN A SEASON**



## Seed production technology for Asian seabass, *Lates calcarifer*

- Adult and sub-adult seabass can be procured from wild catch or from farm reared stock. The fish procured for broodstock should be devoid of external injuries or internal hemorrhage. The fish should be healthy and free from any parasitic infection.
- The fish can be treated with Acriflavin (1 ppm) for 10 minutes and later with antibiotic, Furozolidone (10 ppm) for one hour as prophylactic treatment to avoid infection due to minor injuries if any during collection and transportation.
- The fish should be kept under hatchery condition for 3-5 days for close observation before shifting to brood stock holding facility for further maintenance.

## Seed production technology for Asian seabass, *Lates calcarifer*

- Fishes can be maintained @ 1 kg/m<sup>3</sup> in the broodstock tank.
- In the broodstock holding tanks fishes are fed with trash fish @ 5% of the body weight in frozen form. Fresh low cost fish like Tilapia (*Oreochromis mossambicus*), sardines (*Sardinella* sp.), Horse mackrel (*Decapterus* sp.) etc. can be given to the fish.
- The broodstock tanks are to be disinfected once in three months to avoid contamination.
- From a well maintained broodstock fishes under controlled condition providing good water quality and feed, healthy gravid fishes can be obtained in 6-8 months.

# BROODSTOCK HOLDING FACILITY



## Water Quality management

**WATER EXCHANGE: 75-80%**

**WATER SOURCE : INTERTIDAL BOREWELL**

## WATER QUALITY PARAMETERS

**TEMPERATURE : 28 - 33° C**

**SALINITY : 29 - 32 PPT**

**pH : 6.8 - 8.0**

**DO : 5 - 8 PPM**

**ALKALINITY : 80 - 120 mg/LITRE**

**PHOSPHATE : 10 - 100 mg/LITRE**

**UNIONISED AMMONIA : <0.5 mg/LITRE**

**IONISED AMMONIA : <1.5 mg/LITRE**

# NATURAL SPAWNING

Natural spawning can be achieved by the manipulation of some of the important water quality parameters like salinity, temperature, pH, etc. required for the maturation process, stimulating the conditions prevailing in the marine environment with a flow through arrangement wherein the sea water pumped into the broodstock maturation tanks is recycled using the biological and pressure sand filters so that the water conditions are stable.

With this process, the fish could be made to spawn spontaneously throughout the year, even beyond the normal spawning seasons. This has paved way for the production of seed under controlled conditions throughout the year.

# INDUCED SPAWNING

## Selection of spawners and sex ratio

Matured female fishes will have ova with diameter more than  $450\ \mu$ .

- Males will ooze milt if the abdomen is gently pressed.
- The gonadal condition is assessed by ovarian biopsy. Brood fishes selected for induction of spawning should be active, free from disease, wounds or injuries.
- Female fishes will be around 4-7 kg and males will be 2.0-3.0 kg.



## SELECTION OF SPAWNERS AND SEX RATIO

- Since seabass spawning is found to have lunar periodicity, days of new moon or full moon or one or two days prior or after these days are preferred for inducing the spawning.
- Female seabass are generally larger (more than 4 kg.) and the males are smaller (in the size of 2.0-3.0 kg).
- To ensure proper fertilization normally two males are introduced for one female in the spawning tank.

# INDUCED SPAWNING BY HORMONE INJECTION

- The commonly used hormones in the finfish hatcheries for induced spawning are: LH-RHa, Luteinizing Hormone Releasing Hormone analogue (Available with SIGMA CHEMICALS-USA-ARGENT CHEMICALS), HCG- Human Chorionic Gonadotropins. (Available in Pharmacy-medical shops) Ovaprim, Puberogen, Carp pituitary glands-Pimozide.
- The dosage level has been standardized as LHRHa @ 60-70 µg/kg body weight for females and 30-35 µg/kg body weight for males.
- Since the spawning normally occurs in the late evening hours, when the temperature is cool, hormone is injected normally in the early hours of the day between 0700-0800 hours.



# SPAWNING

Fishes injected with LHRH-a hormone response for spawning after 30-36 hours of injection.

Spawning normally occurs late in the evening hours 1900-2000 hours.

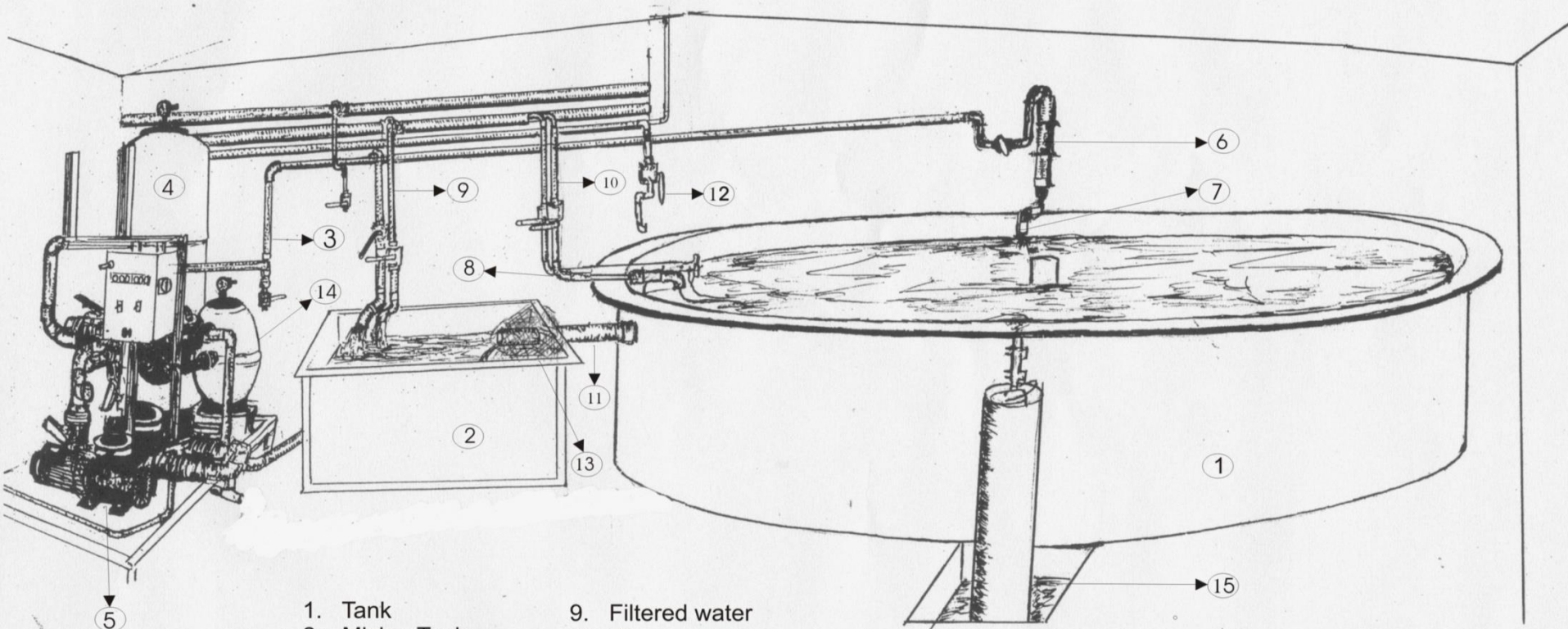
At the time of spawning the fishes will be moving very fast and in the water surface a milky white substance will be seen. There will be a fishy odour which can be felt few meters away.

Prior to spawning activity the males and the female will be moving together exhibiting courtship.

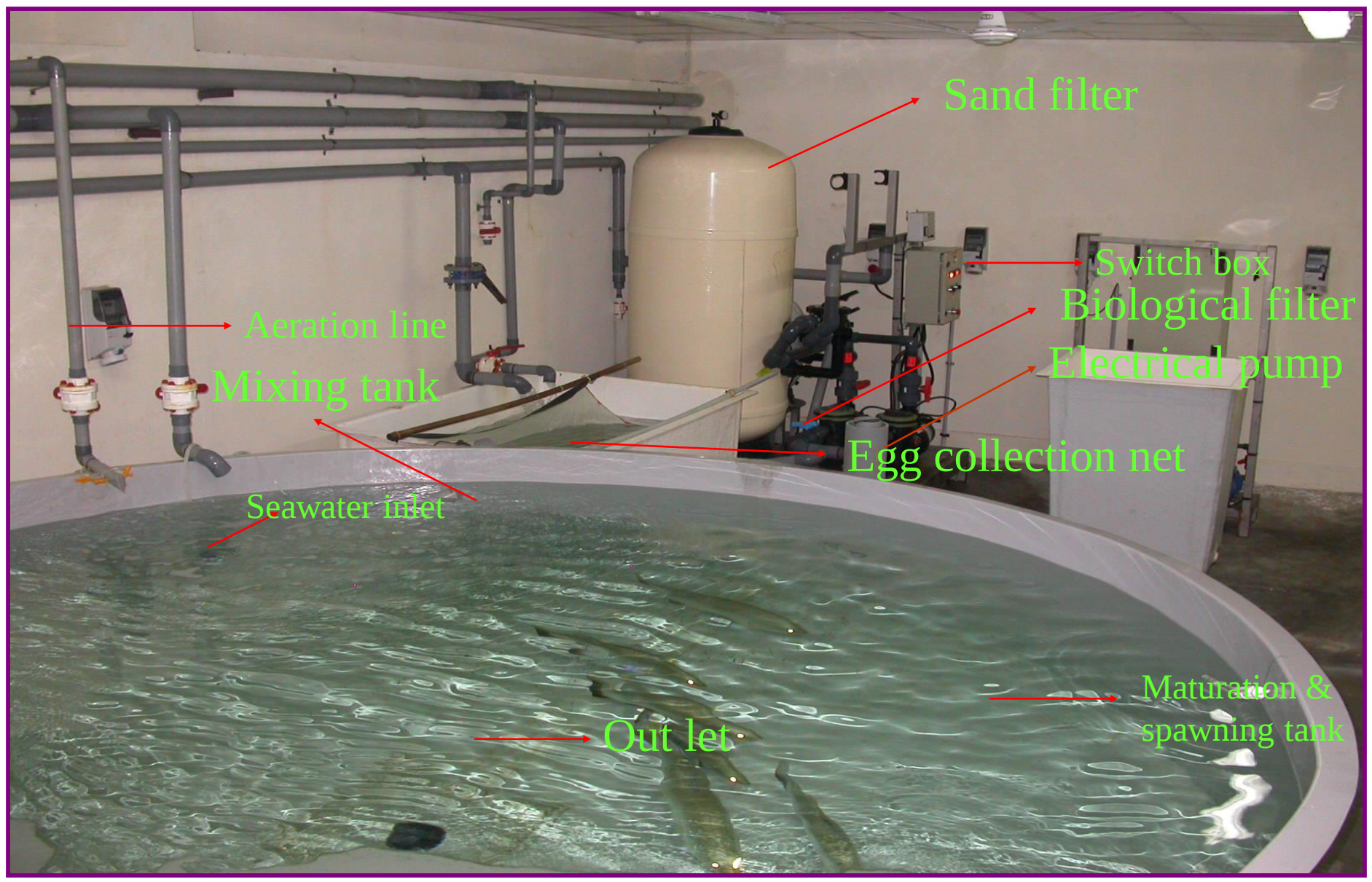
Seabass has high fecundity. It is a protracted intermittent spawner and in one spawning the fish may release 1.0-3.0 million eggs.

The process of spawning will follow during subsequent day also. If the condition is good, both female and male respond simultaneously resulting spontaneous natural spawning and fertilization is affected.

# A SCHEMATIC VIEW OF SEABASS MATURATION AND SPAWNING TANK WITH RECIRCULATION FACILITY



# RECIRCULATION SYSTEM FOR YEAR ROUND NATURAL BREEDING

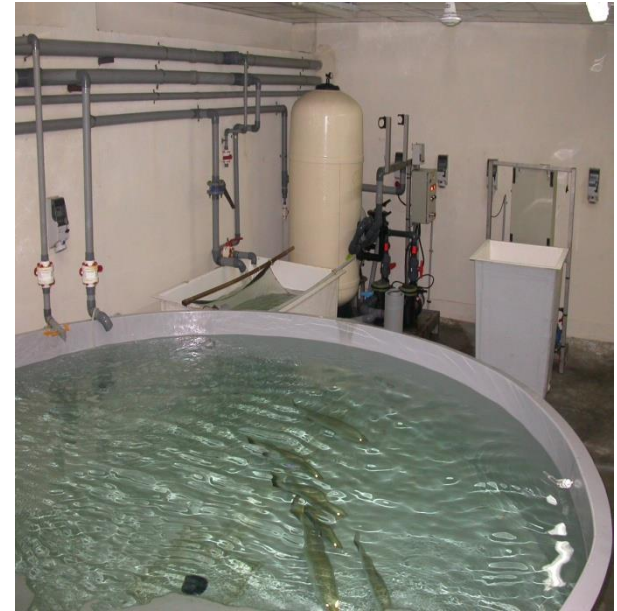


# COMPARATIVE EFFICIENCY OF RAS IN WATER QUALITY PARAMETERS

| S.NO | PARAMETERS                  | WITH RAS    | WITHOUT RAS   |
|------|-----------------------------|-------------|---------------|
| 1    | SALINITY                    | 27 - 31ppt  | 27-31 ppt     |
| 2    | TEMPERATURE                 | 30 - 32°C   | 29-32 °C      |
| 3    | pH                          | 7.8 - 8.3   | 6.5 – 8.0     |
| 4    | D.O (PPM                    | 5.5 - 6.4   | 3.6-4.9       |
| 5    | TOTAL NH <sub>3</sub> (PPM) | 0.003-0.020 | 1.02 - 2.096  |
| 6    | NITRITE (PPM                | 0.001-0.033 | 0.016 - 0.034 |
| 7.   | Alkalinity (PPM             | 100-120 ppm | 140-200 ppm   |

# Fertilization

- Fertilization is external. In natural spawning of seabass in good maturity condition, fertilization will be 70-90%.
- The size of the fertilized eggs will be around 0.75-0.80 mm. The fertilized eggs will be floating on the surface and will be transparent. The unfertilized eggs will be opaque and slowly sink to bottom.
- After spawning and fertilization, the water level in the spawning tanks can be increased and allowed to overflow through overflow outlet. The eggs will be pushed by the water flow.
- Below the overflow pipe a trough covered with bolting cloth of mesh size 150-200  $\mu$  is kept. The water with the egg is allowed to pass through.
- The eggs are collected in the next bolting cloth washed and transferred to the incubation tanks.



# INCUBATION AND HATCHING

- The eggs collected from the spawning tank are washed to remove the debris that would have adhered to and transferred to the hatching tanks for incubation and hatching.
- The hatching incubation tanks can be 200-250 litres capacity cylindro-conical tanks. Eggs are kept @ 100-200 nos./litre density.
- Continuous aeration is provided. Temperature of 27-28<sup>0</sup>C is desirable.
- The eggs will hatch out in 17-18 hours after fertilization. After hatching the larvae are transferred to larval rearing tanks.
- The unfertilized eggs in the incubation tank can be removed by siphoning.
- The larvae are scooped gently using scoop net and transferred into buckets of known volume. After taking random sample counting depending upon the number required to be kept in the rearing tanks, larvae will be transferred to rearing tanks.



# LARVAL REARING

Tanks in the size of 4-5 tonne capacity are preferable for operational convenience.

Freshly hatched larvae from the incubation tanks are transferred carefully to the rearing tanks.

Larvae are stocked initially @ 40-50 nos/litre.

Depending upon the age and size, the larval density is reduced to 20-25 nos/l on 10<sup>th</sup> day and later and after 15 days, the density is maintained around 10-15 nos/l.



# FEED AND FEEDING DURING LARVAL REARING

- Green unicellular algae like *Chlorella* sp *Tetraselmis* sp *Nannochloropsis* or *Isochrysis* sp are needed for feeding seabass larval rearing tanks for water quality maintenance.
- The early stage larvae (up to 7 days) are fed with small sized rotifer i.e. less than 120µm and later assorted size rotifer can be fed.
- Brine shrimp, *Artemia* in nauplii stage are required for feeding the larvae from 9<sup>th</sup> day to 21 days and afterwards *Artemia* biomass can be given.
- Rotifer (*Brachionus plicatilis*) are given as feed to the larvae from 3<sup>rd</sup> day at concentration @ 20 nos./ml initially. From 4<sup>th</sup> day to 15<sup>th</sup> day the rotifer concentration is increased to 30-50 nos./ml gradually. And concentration is increased to 6-10 nos/ml from 9<sup>th</sup> to 15<sup>th</sup> day of rearing.
- *Artemia* nauplii are given as feed along with rotifers and green water from 10<sup>th</sup> day. By this time the larvae will be around 4 mm TL in size.
- Larvae can be feed exclusively with *Artemia* from 16<sup>th</sup> day to 24<sup>th</sup> day @ 2000 nos./l initially and gradually increased to 6000/l as the rearing days progress.

## Water exchange

- To maintain water quality in the larval rearing tanks, 30-40% water change is done daily.
- The salinity should be maintained around 30 ppt. and the desirable range of temperature is 27-29°C.
- The water level reduced (30-40%) in the rearing tank is leveled up with filtered quality seawater and green water after taking cell count of the algae in the rearing tank.
- Algal water is added daily upto 15<sup>th</sup> day.
- After bottom cleaning and water reduction, while water change is done, algal water is also added depending upon the concentration, (around 20 thousand cells/ ml in the rearing tank).

# NURSERY REARING

***HATCHERY PRODUCED SEED REARED BY PRIVATE HATCHERY OWNER IN THE NURSERY***

**TANK CAPACITY** : 5 TON RCC

**STOCKING DENSITY** : 1000 NOS/M3

**REARING PERIOD** : 35 DAYS

**AVERAGE SIZE AT THE TIME OF STOCKING** : 0.9 mm

**SIZE AT THE TIME OF HARVEST** : 1.25 g ( 0.4 to 3.0g)

**SURVIVAL RATE** : 82%

## **FEED**

**FIRST 10 DAYS ARTEMIA AND MINCED FISH MEAT AFTERWARDS MINCED FISH AND PRAWN MEAT @ 20% OF BODY WEIGHT**

**WATER CHANGE** : 50 - 60% DAILY

# HAPA NURSERY REARING

- Three densities @ 250/m<sup>2</sup> 375/m<sup>2</sup> and 500/m<sup>2</sup> were selected
- Sea bass fry with initial mean body length of 11mm (9-14mm) and mean body weight of 20mg (14-30mg) were stocked in the hapas.
- They were fed with a mixture of fish meat and artificial diet two times per day @ 25-100g/time.
- Maximum survival was recorded with 55.7% in the hapas with the stocking density @ 250nos/m<sup>2</sup> followed by 44.2% and 47.2% in 375/m<sup>2</sup> and 500 nos/m<sup>2</sup> densities respectively.
- Weight varied from 80 mg to 0.3 g.



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