



SEABASS SEED ADVISORY

How to maintain healthy broodstock?

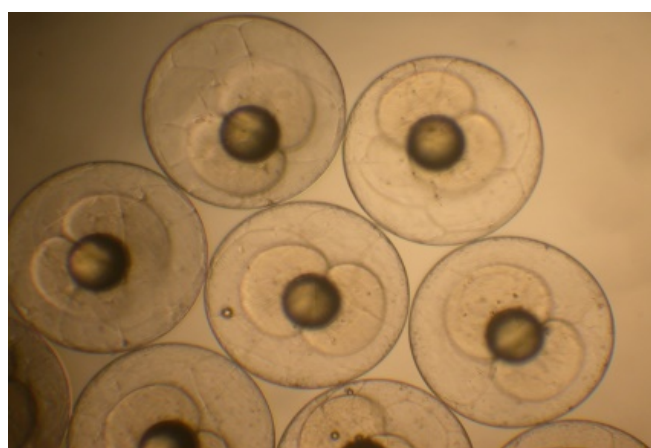
- Seabass is a protandrous hermaphrodite, early mature as males (2.0-3.0kg) and become females (>4.0 kg). Important to maintain two size groups to have adequate broodstock fishes in the hatchery
- Pathogen free broodstock to be strictly used. Viral Nervous Necrosis is the most prevailing disease in this fish. Subjecting broodfishes through quarantine procedures is mandatory to have VNN free broodstock after adequate prophylactic treatment.
- RAS based broodstock maintenance is advisable to have better control over water quality and health management



Seabass brooders in RAS tank

Criteria to select high quality spawn

- Fertilized eggs/spawn can be obtained after administration appropriate hormone. Spawn are transparent, by over flow method through egg collection net.
- Unfertilized eggs are opaque, sink at the bottom of the spawning tanks, which can be drained out properly to



Fertilized eggs of seabass

avoid the contamination. Eggs can be subjected to iodophore treatment before transferring to hatching tank.

- Fecundity of seabass is high ranging from 2 and 10 million eggs. It is a batch spawner and optimal sized female may be selected based on the capacity of the hatchery.
- Size of fertilized eggs are one of the quality indicator from 760 to 790 μm . Fertilization over 80% is good indicator and below 50%, it for efficient larval rearing.





- Latency period 30-36 h and incubation period 17-18 h is an indicator of normal spawning. Stocking @ 500 eggs/litre is advisable during hatching. Unfertilized eggs in the incubation tanks should be removed at the earliest.

Protocols to produce healthy larvae

- Normal hatchlings measure 1.60-1.75 mm. Yolk and oil globules act as nutrient reserve until first feeding and determines larval survival
- Larvae are photo-tactic collected by gently scooping using small container for easy transfer into rearing tanks. Ensure the larvae had no deformities and have normal swimming behaviour.
- Seabass larvae cannibalistic. To avoid the differential growth and shooter development, regular grading at 3-4 days interval to be done from 18th day post hatch. Care should be taken that they are not injured while handling.

- Pathogen free broodstock
- RAS based rearing
- Healthy & uniform size seed
- Safe handling and transportation
- 3 tier farming system



- Artificial feeding can be initiated by 17dph by co-feeding with *Artemia* nauplii and complete weaning done 25-30 dph.
- By 18-25 days, larvae metamorphose in to fry. By 30-35 days, the fry is ready for nursery rearing

How to produce quality seabass fry?

- 30 days old fry (1.5 cm) stocked in the nursery tanks @ 500 no/m² attains around 7.5 cm in 60 days culture with 65-75% survival rate. Grading @ 3-4 days done to remove shooters and to maintain uniform size seed for better survival rate.
- Hapa based nursery rearing (2x1x1 m) mesh size 1.5-2 mm used. It is a skill based activity where labour is required during grading and conducted as a group for easy operation
- The seed has to be screened for checking the VNN at all stages to ensure the production of pathogen free seed
- Transportation of fry (1.5 cm) @ 350-500/5 L is done in polythene bag for 24 hr travel in 26-28°C water temperature after placing in cardboard boxes.

Methods for fingerling production

- Transportation of large sized seed to culture site is expensive. To avoid these problems,, nursery rearing can be done at the site very close to pre-grow out culture sites
- Seabass fingerlings need to be acclimatised to any salinity ranged 0-35 ppt in a gradual manner.
- Pre-growout culture maybe done in small volume cages (mesh 8-12 mm). Stocking can be done @ 300/m³. Feeding done with artificial feeds @ 2-3 times daily. Grading done once a week. It helps to get a survival up to 80% in 90 days rearing and attaining body weight 60-80g
- Fingerlings handling should be careful, since they are very sensitive and easily can be injured. Fingerlings transported in the open tanks with oxygen bubbling for grow out culture.



Farmer with harvested seabass



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Milkfish Seed Advisory

How to quarantine milkfish broodstock to produce healthy spawn?

- Quarantined pathogen free broodstock fishes can be used for breeding to avoid vertical transmission of disease from broodstock to spawn, larvae and fry. Pathogen screenings have to be done at all seed stages to ensure disease free seed production.
- Spawn quality can be assessed based on the size, shape, cell of development, oil globule intactness and fertilization rate.
- Milkfish spawning takes place in the open tank system, hence, the spawn collected from these tanks should be washed thoroughly with seawater and treated with iodophore solution to avoid the contamination.
- Milkfish fertilized eggs are pelagic and float on water surface. These transparent eggs should be collected carefully either by siphoning or by over flow method without contamination of unfertilized eggs.
- Unfertilized eggs are opaque and usually settle at the bottom of the spawning tank. These unfertilized eggs can be drained out for careful disposal.
- Milkfish eggs are spherical shape and size measured between 1.20 and 1.24 mm. The egg may vary from batch to batch. Normal size eggs can be preferred while collecting the spawn.
- If the spawn is to be transported for long distance (up to 20 hrs) for hatching and rearing, the fertilized eggs can be packed @ 8000 to nos. / polythene bag (5.0 litre seawater) with oxygen bubbling. Ice can be kept in the box to minimize the temperature during transportation.

Principles of milkfish larval production

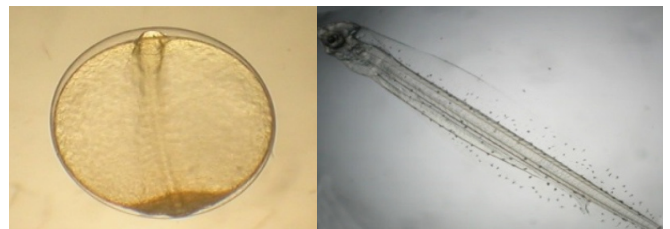
- The average size of newly hatched milkfish larvae is between 3.2 and 3.5 mm, hence, every larval batch have to be measured to

ensure that the hatchlings to be stocked are in ideal size (above 3.2 mm), without deformities, and normal swimming behavior.

- Larvae are photo tactive and need to be collected slowly by scooping using bowl or beakers.
- Unfertilized eggs in the incubation tanks should be removed either by draining out through outlet pipe or by siphoning out through hose pipe.
- Yolk present in the newly hatched larvae act as nutrient reserve till the time of first feeding with live feed. Hence, volume of yolk that larvae possess in it is an indicator to



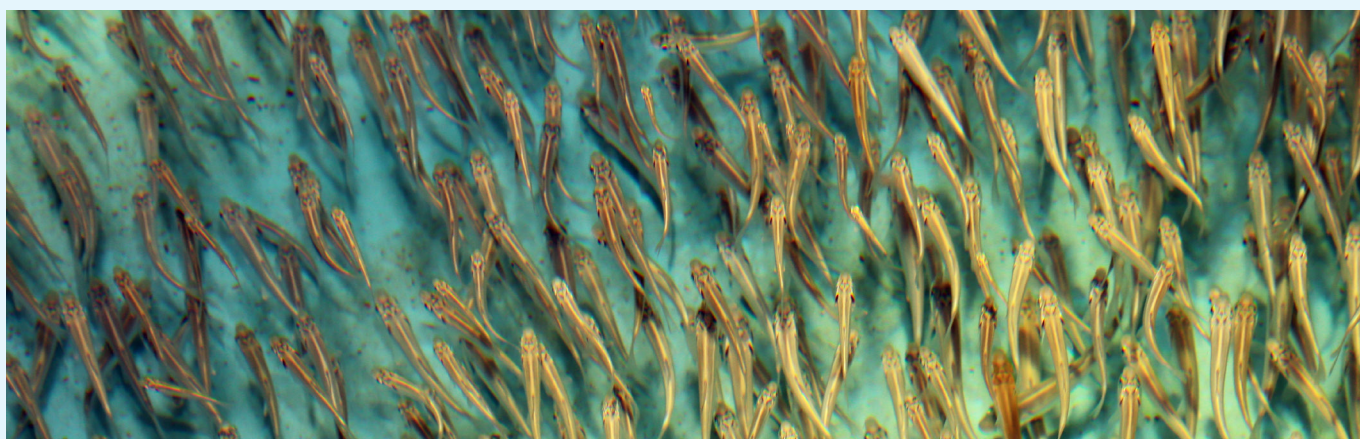
Milkfish broodstock



Transparent fertilized egg

Healthy larvae (2nd day)





undergo normal larval development and growth. Therefore, the larvae selected for rearing should have large yolk sac.

- Larval deformity (scoliosis/ opercula deformity) should be minimum in any successful rearing and if it exceeds acceptable limit then whole batch can be avoided.
- Larvae have to be handled carefully in the hatchery during water exchange, segregation, tank cleaning etc., to minimize the stress and injury and to avoid the secondary infection
- Larvae can be weaned to the artificial diet between 30-35 days post hatch to produce fry size seed (25 mm). These seed can be collected from the larval rearing tanks carefully without injury and stress and can be packed in the polythene covers with oxygen bubbling at specific density considering the transport duration for nursery rearing.

- Quarantine broodstock fish
- Select healthy larvae above 3.2 mm
- Quality fry exhibit schooling behaviour
- Stunted seed offer compensatory growth



Early fry of milkfish (30 days old)

Best method to produce milkfish fingerlings

- The weaned fry (> 25 mm) can be stocked in the nursery ponds at specific density to produce fingerling seed. The stocking has to be done after acclimatizing the seed to the pond water condition to avoid the sudden stress.
- Nursery rearing ponds prepared with lab-lab growth would provide the natural diet to milkfish fry. Since milkfish seed is very active and jumpy in nature, it is advised to take up milkfish nursery rearing adjacent to grow out culture pond sites, so that fingerling transportation would be easy to stock in the grow out system without stress.
- After reaching the fry into fingerling size of 3-4 inch, the seed can be carefully harvested using soft drag net and transported to the grow-out culture pond. Care should be taken while netting the seed to avoid the injury.
- The milkfish fry in the size of 25mm can be packed @ 300 to 400 nos/bag for 24 hrs transportation to the farm site. and after acclimatization it can be stocked in the grow out pond



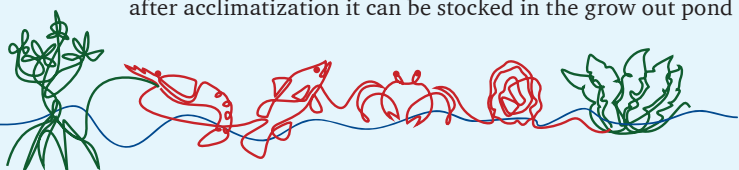
Grading of milkfish fry



Fingerlings produced in 90 days rearing duration



Harvested milkfish from hatchery produced seed



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Pearlspot Seed Advisory

How to develop healthy pearlspot broodstock?

- Quarantined pathogen free healthy broodstock should be used in captive breeding for producing high quality fry and avoiding vertical transmission of diseases.
- Good quality broodstock feed *EtroBrood^{plus}* formulated by ICAR-CIBA for high quality broodstock and seed.
- Broodstock of pearlspot should be handled gently preferably with a soft cloth net to avoid injury and fungal infections.
- For avoiding parasites, prophylactic treatment can be done with suitable agents.

How to increase the spawning frequency in pearlspot?

- Pearlspot is unique as it exhibits parental care. Fecundity of pearlspot is low, lays 800-2000, eggs size 2.0 mm. Eggs are oblong, heavily yolked, adhesive and takes three days



Pearlspot broodstock for captive seed production



Eggs of pearlspot are initially light and get progressively brown in colour

for hatching. Initially eggs are light peach and changes progressively to brown color. These differences in colouration helps to assess the days post hatching.

- Egg caring by the parent fishes ensures a good hatching rate through continuous fanning and clearing by parent fish. If the eggs are separated from the parents, it is desirable to give a continuous flow of filtered water of the same salinity and provide a steady aeration in the proximity of the substrate where eggs are attached.
- Fertilised eggs are very susceptible to fungal infections in the absence of parental care. It is desirable to give an anti-fungal treatment to eggs to prevent infections and optimise hatching rates.
- A healthy batch of pearlspot eggs will not be having any evident white discoloration indicative of fungal infections.

How to assess healthy pearlspot larvae?

Wriggler phase-

- Newly hatched pearlspot larvae measure approximately 5.5 mm. The larvae have large yolk sac measuring over 2 mm. A good larval size and yolk content is an index of healthy larvae and ensures good larval survival rates.





Free swimming larvae of pearlspot

- The larvae are demersal and appear as clusters at the bottom of the rearing container. The larvae show wriggling behaviour when disturbed. This is a non-feeding stage where larvae subsist on endogenous yolk. A healthy batch of larvae at this stage can be identified by their clustering behaviour.

Free swimming larvae

- By 3 days post hatch (TL- 6mm), yolk sac is partially utilized and the mouth opening is visible. Pectoral fin is well formed and the larvae initiate swimming at this stage. By day 4 most of the larvae develop the capacity to swim in a shoal



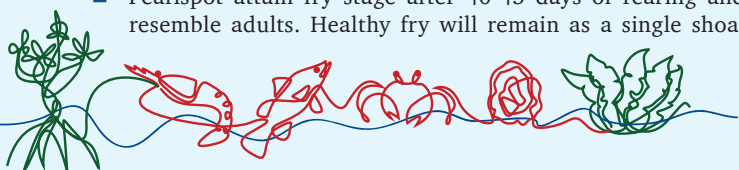
Free swimming larvae of pearlspot

and feed organisms can be observed in the gut indicative of active exogenous feeding. This is a sign of healthy larvae in the initial stages. Scattered larvae or floating larvae are indicators of poor health of the batch of pearlspot larvae.

- Gentle siphoning using aeration tubes is advisable for handling or transfer of larvae without injuries.

Fry

- Pearlspot attain fry stage after 40-45 days of rearing and resemble adults. Healthy fry will remain as a single shoal



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and will be seen swimming actively. Sudden changes in larval swimming and shoaling behaviour, reluctance to accept feed, changes in appearance of larvae with respect to colour or fin erosions are indicative of poor health of larvae.

- Handling of fry stages maybe done gently using soft cloth nets to avoid abrasions and consequent fungal infections.

- Set up modular breeding unit
- Curtail parental care to enhance breeding frequency
- Active shoaling fry indicate quality seed
- Use formulated feed and periphyton substrate for higher fry growth rate

Fingerlings

- Pearlspot exhibit slow growth rates. Pearlspot fry reared in tank systems was found to attain average body weight 6-10 g after 2-2.5 months. Using quality feed and periphyton substrates during nursery rearing can enhance growth of pearlspot.
- Growing pearlspot to larger sizes for stocking in grow-out culture systems is desirable to reduce the culture duration. Healthy seeds of this size will be uniform in size and colour and also without any apparent fin erosions or discolorations.
- At ICAR-CIBA, pearlspot fry, TL, 20 mm are transported in oxygen packing 200 numbers in 5 litres for 24 hours. With increase in fry size or transport duration, the density is reduced accordingly



Pearlspot Juveniles

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Long Whiskers Catfish *Mystus Gulio* Seed Advisory

How to select the broodstock fishes for spawning purpose?

- *Mystus gulio* is a commercially important brackishwater catfish locally known as “Nona tengra”. Kakdwip Research Centre, ICAR-CIBA has developed a Homestead Modular Hatchery Technology of nona tengra for quality seed production and for its grow-out farming.
- Brood fishes have to be quarantined before stocking in the broodstock holding tanks. Pathogen free broodstock fishes only can be used for breeding purposes to avoid the vertical transmission of disease in the hatchery.
- Fecundity of *M. gulio* is between 25000- 50000 eggs. Females with oocyte diameter of 750-800 micron are suitable for spawning induction to produce quality larvae. Therefore, healthy and good size (above 60g), high fecund broodstock fish are preferred for breeding purpose to yield more spawn .
- After spawning, the brood fishes or eggs can be removed and maintained separately since the brood fish has the habit of consuming the eggs .



Mystus gulio broodstock for captive seed production



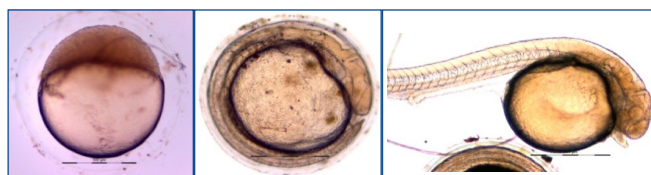
Male

Female

- An optimal latency period of 8-12 h is a good indicator of optimal breeding response to exogenous hormones.

Procedures to obtain quality eggs

- Eggs should be collected carefully for incubation. Size of fertilized eggs is an important indicator of seed quality. Eggs of *M. gulio* are yellow, without oil globules, spherical, adhesive and demersal. A fertilized egg size of 1.0-1.2 mm assures good larval quality.
- Fertilized eggs should hatch out in 17-20 h hours after spawning. Un-hatched/unfertilized eggs (dead eggs) in the incubation tanks should be removed to prevent infections.
- It is advisable to provide continuous flow through and aeration in the hatching tank to get better hatching rate.



Fertilized egg

Embryo

Newly hatched larvae



What are the indicators to select healthy larvae?

- The hatchlings measuring around 2.0-2.2 mm are of good quality and ensure good survival during larval rearing.
- First feeding should be initiated at 36 h before exhaustion of yolk sac at around 48 h. Hence, timely provision of live feed and initiation of exogenous feeding is critical.
- Larvae should be fed with Artemia nauplii from 36 h, and co-fed crumbled feed from 5 dph and exclusively crumble feeding should be given from 15 dph.
- Good larval survival and quality is assured by good management practices; optimal stocking density, 25 numbers per litre and good water quality management.
- A feeding frequency of four per day with Artemia nauplii @ 3000 numbers per litre is ideal.
- A larval rearing period of 30-35 days is required for obtaining a fry size of 48-50 mm.
- Differential growth can be also noticed to some extent and shooters to be removed to avoid possible cannibalism during larval rearing.

- Homestead Modular Hatchery Technology for quality seed production
- Healthy fertilized eggs are light yellow, spherical, adhesive, 1.0-1.2 mm in size
- Separate shooters to avoid cannibalism
- Fry exhibit burying nature

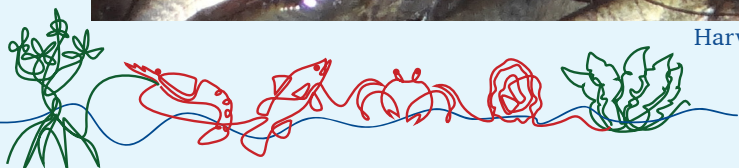
- After pond preparation, a stocking density of 10 no/ m² is suggested and the fry should be fed with pellet feed @ 8-5% of biomass.
- A culture period of 6-month should be practiced for fry to attain average marketable size of 50 to 60 g with production of 1.2 to 2.4 ton/ha.
- For high density farming at a stocking density of 10-20 no./m², Recirculatory aquaculture system-RAS system is suggested and polythene lined small backyard ponds (300 to 500 m²) will be an ideal practice.



Stockable size fry



Harvested fish



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