

**GUIDELINES FOR DEVELOPING FISH SEED  
CERTIFICATION AND ACCREDITATION SYSTEM  
IN INDIA .**

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**Department of Animal Husbandry, Dairying and Fisheries  
Ministry of Agriculture  
Government of India**

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## CHAPTER 1: INTRODUCTION

Domestication and advancements in induced breeding technology have enabled captive propagation of several fish species in India. However, a sustainable aquaculture production system for these species requires good quality fish seed to ensure economic viability of the operations.

Fish production in India has grown several folds over the years to approximately 9.58 million tonnes in the year 2013-14 from a meager 0.75 million tonnes in 1950. The fisheries sector contributes nearly Rs.78053 crores, i.e. 0.83% to the total national gross domestic product (GDP) and 4.75% to agricultural GDP. Nearly 14 million fishers and fish farmers are dependent on this sector, which is also a major contributor to foreign exchange of Rs.30213.26 crores (2013-14).

Aquaculture is increasingly contributing to the fish basket of the country. Carps and shrimps form the mainstay of freshwater and coastal aquaculture respectively. The seeds of blue revolution in the country were sown with the development of captive propagation technology of Indian major carps. These carps contribute nearly 5% to world aquaculture production, of which nearly 76% comes from Indian aquaculture. Such production levels could be achieved due to captive seed production of these carps. The fish seed production of India is estimated to be 4145 crore fry through a network of nearly 1,100 hatcheries in 2013-14. However, there are concerns with regard to quality pertaining to inbreeding depression inadvertent hybridization as also improper sizes of seed stocked, leading to non-realization of full potential.

India, with a total post larvae production capacity of 1,058 crore from about 266 hatcheries, is one of the major shrimp producers in the world. However, the shrimp farming in the country is plagued with white spot viral disease since 1995 and the seed is considered as one of the major source for spread of the viral infection. Stocking of disease-free shrimp seed is being realized globally as a pre-requisite to ensure sustainable shrimp farming. This will go a long way in ensuring healthy growth of the sector. However, only registration may not be adequate to address the issue of quality seed production. In order to ensure seed quality, it is essential to accredit the hatcheries, after their evaluation for compliance to specified norms.

In tune with the recent thrust on diversification of the aquaculture practices, freshwater prawn (*Macrobrachium rosenbergii* or Scampi), catfishes and ornamental fish farming are gaining importance. More and more species are likely to be brought in the aquaculture practices including mariculture in future.

Presently, hatchery produced seed is meeting most of the requirements of the aquaculture sector. To ensure quality of seed and sustainability in its production process, it is essential that the hatcheries use broodstock, breeding and husbandry practices as per scientific norms. Similarly, it needs to be ensured that the seed farms use spawn obtained from reliable hatcheries that follow the norms of quality and sustainability. There is an immediate need for regulations for seed



certification and accreditation of seed production centres on the lines of provisions existing in the farming sector. The essential elements of a proposed accreditation and certification system are given in the following pages. However, it is very important to note that production and trade of fish and finfish in India is a highly dispersed and unorganized activity that operates at various social, economic and geographical scales. Notwithstanding the need to make the fish seed production environmentally sustainable and socially equitable, it is a stupendous task to bring the whole range of seed production activities under this accreditation and certification regime. Obviously, this needs to be done in phased manner after taking all stakeholders into confidence. Equally important is the need to launch a campaign to build the necessary awareness among the seed producers and users about the need to make the fish seed production sustainable.

Quality seeds are not only important from the point of view of fish production but also from the viewpoint of international trade. Labeling and certification are important parameters in international trade today. International organizations like FAO also emphasize the need for development of a seed certification and accreditation system. FAO's technical guidelines on certification in aquaculture also give importance to development of seed certification system as part of aquaculture certification.

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## CHAPTER 2: AGENCY FOR IMPLEMENTING THE ACCREDITATION OF HATCHERIES AND SEED FARMS

### 2.1 Establishment of an Empowered Body/Agency

Accreditation of hatcheries and seed farms is a specialized and manpower-intensive technical process. Therefore, organizational arrangements supported by an effective seed law are required. Aspects of accreditation will be dealt by an appropriate Body/Agency empowered by the State Government. This Body/Agency can either conduct the necessary inspections to certify the seed production units or obtain the services of competent private/public agency(ies) to do so by empowering them to certify the units. The accreditation Body/Agency will have an apex body that consists of a Chairman and 4 Members to be appointed by the State Government.

Chairman:

Member (Inland Fisheries Expert)

Member (Marine Fisheries Expert)

Member (Fish seed representative)

Member Secretary

### 2.2 Functions of the Accreditation Body/Agency;

- a) To ensure the operation of hatchery accreditation programme, across the state including identification of the challenges in its implementation and laying appropriate procedures to overcome these challenges.
- b) To develop necessary infrastructure facilities, manpower and financial resources to undertake accreditation programme.
- c) To authorise Certifying agencies/individuals for undertaking evaluation and reporting for accreditation of hatcheries and seed farms.
- d) To take up the issues pertaining to legal problems that may crop up during implementation of seed certification.
- e) To recommend modifications in standards and procedures for accreditation and certification process, from time to time, if needed.
- f) To undertake promotional activities to build awareness on the need for using of seed and bloodstock from accredited hatcheries/seed farms.
- g) To prepare detailed manuals on brood stock selection and maintenance, seed production practices and testing procedures through expert groups. (These manuals will be used during inspection for accreditation and for subsequent monitoring. These will also be distributed to all production units in the fish seed industry for compliance).
- h) Any other issues that arise from time to time.
- i) The ICAR or any specialist institute(s) will provide appropriate technical backstopping to the designated authority in developing norms for certification and accreditation



### 2.3 National Steering Committee

Looking at the massive physical and economic losses due to infectious and contagious diseases of animal which may have enormous impact in the country, the Central Govt. has enacted the Prevention and Control of Infectious and Contagious Diseases in Animals Act 2009 (27 of 2009). This act provides powers especially to State Governments to implement prevention, control and eradication of infectious and contagious diseases affecting animal, or prevention of outbreak or spreading of such diseases from one state to another and to meet the international obligation of India for facilitating import and export of animals and animal products which also includes aquatic animals and their products by subsequent amendment made thereafter.

Further, it has been realized that the prevention, control and eradication of infectious and contagious diseases in India has to be tackled at national level with the active involvement of the State Governments, particularly with regard to the precautionary measures required to be taken within their jurisdiction in respect of certain infectious and contagious diseases and regulation of movement of animals outside their respective areas by timely adoption of appropriate measures.

In view of the above, there shall be a National Level Steering Committee consisting the following:

- |                                                                                    |   |          |
|------------------------------------------------------------------------------------|---|----------|
| 1. Joint Secretary ( Fisheries), DADF                                              | - | Chairman |
| 2. Chief Executive, NFDB                                                           | - | Member   |
| 3. Representative of the State Governments<br>(Two each from East and West Coasts) | - | Member   |
| 4. Representative of ICAR                                                          | - | Member   |
| 5. NSPAAD Coordinator                                                              | - | Member   |

### 2.4 Terms and Reference of the Apex Committee

- a) The National Level Steering Committee shall review the function of the Accreditation Body/ Agency
- b) The said Committee shall look into the risk associated in movement of fish / shrimp seed as per the provisions in the Prevention and Control of Infectious and Contagious Diseases in Animals Act 2009 (27 of 2009) and shall suggest necessary action to be taken by the respective State Government or the Accreditation Body/Agency therein.
- c) This Committee shall link the National Surveillance Programme for Aquatic Animal Diseases (NSPAAD) with the surveillance of pathogens for accreditation of seed keeping in view of the provisions given under the Prevention and Control of Infectious and Contagious Diseases in Animals Act 2009 (27 of 2009) and also the listed pathogens thereunder.



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## CHAPTER 3: PROCEDURE FOR ACCREDITATION OF HATCHERIES AND SEED FARMS

The following description provides general guidelines, which are applicable to all aquaculture species.

### 3.1 Procedures for Accreditation of Hatchery

Separate application for accreditation of hatcheries/seed farm, needs to be submitted for: (a) aquaculture species and (b) variety of aquaculture species (such as *Jayanti rohu*)

- i. The hatcheries/Seed farms shall apply with the State Fisheries department for accreditation on a prescribed application form (Annexure V) along with all necessary supporting documents.
- ii. The Accreditation Body/Agency will arrange for necessary verifications and evaluation, through certifying agencies, as per benchmarks given in subsequent chapters.
- iii. The hatcheries/seed farms, once accredited can certify that their produce complies with specific norms and use the accreditation mark, 'FISHMARK' with hologram.
- iv. Hatcheries/Seed farms shall be species-specific (including multi-species, hybrids and improved varieties), and need to be accredited separately.
- v. During the accreditation process, verification of seed and broodstock will be done for:
  - Production parameters and compliance to standards under specified norms of management
  - History of disease outbreak
  - Surveillance for pathogens and water quality for one period by the State Governments along with the empanelled expert of NSPAAD.
  - Genetic introgression / hybridization levels (in case of carps and catfish)
- vi. For improved varieties and hybrids, the verification will be done in a similar manner with suitable norms.
- vii. After the grant of certificate of accreditation, hatcheries will print their test certificate and sealing tags as per the approved format.
- viii. It will be mandatory for intermediary seed producers to procure initial seed material from accredited hatcheries. To ensure quality, such intermediary seed producing farms should be accredited after verification for environmental and water quality norms.

### 3.2 Accreditation of the unit where the ownership changes

If the ownership of the seed production unit changes, both the original and new owners/firms need to inform the empowered agency along with documents of transfer. The new owner will apply for transfer of accreditation certificate in his favour. To obtain such transfer, the new owner needs submit an undertaking that he will maintain all the norms of quality standards as is required for the accreditation.

### 3.3 Display of Certificate

The certificate of Accreditation should be displayed at a prominent place in the hatchery/Seed farm premises.

### 3.4 Cancellation of Accreditation

The Accreditation of unit will be cancelled under the following circumstances:

- a) The facility ceases to possess the minimum infrastructure facilities
- b) The facility is not functional for more than one year without valid reasons.
- c) Seed produced in the hatchery does not meet the quality standards prescribed by the accreditation Body/Agency
- d) The facility fails to rectify the faults noticed and given in writing by the Empowered agency *(if the faults remain unrectified even after three consecutive visits by the Agency at monthly intervals, the accreditation cancels immediately)*
- e) The facility is found to be using prohibited feed ingredients, hormones, antibiotics or any other pharmacologically active substances.
- f) The facility does not maintain the necessary infrastructure facilities in good condition
- g) The facility has obtained the certificate of accreditation by furnishing incorrect information

If the facility is found to raise, or produce seed of, a species of fish/organism that is banned for culture, not allowed for domestication or has not been introduced through the procedures laid under the law.

### 3.5 Revalidation of Accreditation

The Accreditation of hatcheries/farms is valid for a period of 5 years. At the end of validity period, the facility is required to apply afresh for obtaining revalidation of its Accreditation. The process of revalidation will involve all the necessary steps required for Accreditation of a new facility.



## CHAPTER 4: SUGGESTED BENCHMARKS FOR ACCREDITATION

### 4.1 BENCHMARK FOR CATFISH<sup>1</sup> SEED PRODUCTION UNITS

#### A. Water Supply and Quality

For Accreditation of catfish hatcheries, an assessment of water quality will be made twice a year with one report during the period of hatchery operation and second after six months. Water quality will be tested at an appropriate interval for seed farms. The following are the water supply and quality requirements of a seed production unit:

Water	Requirement
1. Water supply	Adequate and from regular dependable source
2. Type of Water Source	Direct ground water <i>(to be collected in open pond before pumping)</i>  Open water body such as rivers/streams/ lakes, etc <i>(to be allowed only if found to be free from any kind of pollution)</i>
3. Water quality.	Free from algal blooms  Conforming to the parameters given in Annexure III <i>(Test Report generated through standard test procedures need to be enclosed)</i>  Free from pesticide and heavy metal contamination <i>(Analysis report is mandatory).</i>  Free from pathogens <i>(Negative report for pathogens listed in Annexure IV is necessary. Test report generated through standard test procedures needs to be enclosed)</i>

#### B. Infrastructure facilities for hatchery and seed raising ponds

1. The infrastructure facilities for hatchery and seed raising units, as given below, are indicative and not exhaustive. Needs vary for different seed production facilities.
2. The appropriate levels of flexibility can be allowed, with respect to the construction and lay out of the physical facilities at the time of verification, depending upon the local circumstances, provided the specified capacities, water quality, seed and broodstock assessment reports are compliant to the norms.
3. Components such as soil and water testing facility, office, store room, staff quarters and security system are optional and should be built as per requirement and convenience.

<sup>1</sup> The present description for catfish pertains only to magur (*Clarias batrachus*)

Physical facilities	Fry production capacity	
	1 lakh	2 lakh
Overhead water tank (L)	20,000	20,000
Number of tube well/ Open well	1	1
Water pump	3 HP- electric one 5 HP diesel (stand by)	3 HP- electric one 5 HP diesel (stand by)
Number of Air blowers	2	2
Number of incubation pool with flow-through facility (plastic tubs, 1 ft.dia)	24	24
Number of Larval rearing tanks (Ferro cement/ FRP)	15 (1.5 m dia)	20-25 (1.5 m dia.)
Number of Brood fish pond	2 (0.02 ha each)	2 (0.02 ha each)
Land requirement (Area)	0.5 acre	0.5 acre
Number of Technicians (optional)	1	1 - 2

### C. Competence of Hatchery Manager/farm manager/Operator / Owner

Practicing farmer in catfish seed production/ A qualified professional from a recognized SAU/ Fisheries College.

### D. Assessment of Broodstock

1. For accreditation of catfish hatcheries, an assessment of broodstock is done prior to breeding through random experimental netting of brood stock ponds.

General health (Assessed through visual examination)	1) Healthy with clear smooth skin without fin loss or any wounds on barbel. 2) Actively moving
Size	100-150 g
Stocking density in broodstock tanks	2-3 / m <sup>2</sup>
Disease screening for brood stock	1) No external signs of infection 2) Negative test Report of the test for pathogens listed in Annexure IV (Test report needs to be enclosed.

### E. Gross examination of catfish<sup>2</sup> seed

Size	15-20 mm
Colour	Black/pink body without any whitepatches on the body.
Swimming motion	Actively swimming
Food Acceptability	Ready acceptability of natural/artificial diet..
Gut status	Full gut
Body feature	Smooth and slimy skin, barbells intact and no wounds in fins
Screening of seed for diseases	1. No external sign of infection/parasite 2. Negative test report for the pathogens listed in Annexure IV, conducted as per the standard test procedures. (Test report needs to be enclosed)

<sup>1</sup> The present description for catfish pertains only to magur ( *Clarias batrachus* )



## **F. Operations and Record Maintenance of the Hatchery /Seed Farm**

- 1) The assessments that are done during accreditation process must continue at the Seed production unit after the accreditation is granted.
- 2) Proper record should be maintained to facilitate the claim that the seed produced from the unit is compliant to the norms of accreditation.
- 3) The Unit should document standard operating procedures and all the workers should be aware of the contents.
- 4) A Seed production unit should maintain the following records:
  - a. History of broodstock and replacement of broodstock done from time to time
  - b. Breeding programme and production levels at spawn, fry and fingerling levels
  - c. Details of daily farm activities (Test reports of water quality to be done twice a year, for the parameters including pathogens as given above).
  - d. Assessment of parameters for seed quality (visual examination) as given above
  - e. Details of disease occurrence and mortality
  - f. Details of husbandry and management practices like feed, treatments etc.
  - g. Seed shipment details

## 4.2 BENCHMARKS FOR ACCREDITATION OF FRESHWATER PRAWN HATCHERIES

### A. Water Supply and Quality

For Accreditation of freshwater prawn hatcheries, an assessment of water quality will be made twice a year with one report during the period of hatchery operation and the second after six months. The following are the water supply and quality requirements.

Water	Requirement
1. Water Supply	Adequate and from a regular and dependable source
2. Type of water source	Direct ground water ( <i>to be collected in open pond before pumping</i> ) Open water body such as rivers/streams/ lakes, etc ( <i>to be allowed only if found to be free from any kind of pollution</i> )
3. Water quality	Free from algal blooms  Conforming to the parameters given in Annexure III  ( <i>Test Report generated through standard test procedures need to be enclosed</i> )  Free from pesticide and heavy metal contamination ( <i>Analysis report is mandatory</i> ).  Free from relevant pathogens causing diseases ( <i>Negative report for relevant pathogens causing diseases listed in Annexure-IV is necessary</i> ). Test report generated through standard test procedures needs to be enclosed)

### B. Infrastructure facilities

The Infrastructure facilities given below are indicative and not exhaustive. Needs vary for different seed production facilities.

1. The appropriate levels of flexibility can be allowed at the time of verification, depending upon the local circumstances, provided the water quality, seed and broodstock assessment reports are compliant to the norms.



2. Other components like soil and water quality facility, office, store room, and staff quarters and effective security personnel are optional and should be built as per requirement and convenience.

Sl.No	Physical facilities	Capacity in millions		
		<10	10-30	>30
1	a) Sea water storage tank (in L)	40,000	60,000	80,000
	b) Freshwater storage tank (in L)	45,000	90,000	120,000
	c) Number of Mixed water storage tank-	3 (40,000 liters)	3 (70,000 liters)	3 (100,000 liters)
2	Number of broodstock holding tanks	3 (10,000 liters)	7 (10,000 liters)	9 (10,000 liters)
3	Larval rearing tanks (in L)  (Total capacity, size and numbers may vary as per the design and space availability)	30,000- 60,000	60,000- 150,000	>200,000
4	Post-larval rearing tanks	10 (10,000 litres)	15 (10,000 litres)	20 (10,000 litres)
5	<i>Artemia</i> hatching tanks	3 (100 litres)	4 (400 litres)	6 (400 litres)
6	Air blowers	2 (5 HP)	2 (10 HP)	2 (15 HP)
7	Land (ha)	0.5	1.0	1.0
8	Qualified / experienced personnel	1	1	1
9	Laboratory	With adequate facility for routine analysis		
10	Quarantine and Disinfection Facility	One closed building with tanks and separate water supply, airline and drainage system as per the scale of operation of the hatchery		

### C. Assessment of Brood stock

1. For accreditation of hatcheries, an assessment of broodstock is done during breeding at least for three batches of brooders.
2. General assessment is also done through random experimental netting of broodstock tanks.

General health (Assessment through visual examination)	1. Apparently healthy with clear smooth shell, without any black spots on the shell or appendage loss.
size	2. Actively moving >60 g
Stocking density in brood stock tanks	1-2/m <sup>2</sup>
Disease screening for white muscle virus	Broodstock should be screened for white muscle virus using latest technique available

### D. Assessment of Prawn Seed

1. For the accreditation of hatcheries, an assessment of seed is done for at least three batches of production at the PL.10 stage.
2. A batch of PL 10 should be considered healthy if more than 95 % of the population meets the following conditions:

Gross examination for health assessment	
Size	> 20 mm
Colour	Translucent body without any white patches on the body.
Swimming motion	Actively swimming
Food Acceptability	Ready acceptability of natural or artificial diet.
Gut -fullness	Full gut
Rostrum	Rostrum straight not broken
Muscle to gut ratio	High (>3:1) Gut appears thin, muscle in 6 <sup>th</sup> segment wider
Muscle condition	Abdominal muscle clear, smooth and transparent
Black spots	No black spots present on the body and appendages
Appearance of appendages	Intact without any deformity or black or brown spots
Screening of seed for disease	1. No epibiont fouling on body or gills 2. Negative test report for the pathogens causing diseases listed in Annexure IV. Test to be conducted as per standard procedures (Test report needs to be enclosed)



### 4.3 BENCH MARKS FOR ACCREDITATION OF CARP SEED PRODUCTION UNITS

#### A. Water Supply and Quality

For Accreditation of hatcheries, an assessment of water quality will be made twice a year with one report during the period of hatchery operation and second after six months. Water quality will be tested at an appropriate interval for seed farms. The following are the water supply and quality requirements of a seed production unit:

Water	Requirement
Water supply	Adequate and from a regular and dependable source
Type of water source	Direct ground water ( <i>to be collected in open pond before pumping</i> )  Open water body such as rivers/ streams/ lake, etc ( <i>to be allowed only if found to be free from any kind of pollution</i> )
3. Water quality	Free from algal blooms  Conforming to the parameters given in Annexure III ( <i>Test Report generated through standard test procedures need to be enclosed</i> )  Free from pesticide and heavy metal contamination ( <i>Analysis report is mandatory</i> ).  Free from pathogens causing relevant diseases. ( <i>Negative report for pathogens listed in Annexure IV is necessary. Test report generated through standard test procedures needs to be enclosed</i> )

#### B. Infrastructure-facilities for hatchery and seed raising ponds

1. The infrastructure facilities for hatchery and seed raising units, as given below, are indicative and not exhaustive. Needs vary for different seed production facilities.
2. The appropriate levels of flexibility can be allowed, with respect to the construction and layout of the physical facilities at the time of verification, depending upon the local circumstances, provided the specified capacities, water quality, seed and broodstock assessment reports are compliant to the norms.

3. Components such as soil and water testing facility, office, store room, staff quarters and security system are optional and should be built as per requirement and convenience.

Physical facilities		Capacity (spawn in millions)		
		>10	10-50	50-100
1.	Hatchery overhead water tank	10,000	30,000	50,000
2	Hatchery Spawning pool diameter (m) (Masonry/FRP structure-one unit each)	4.5	4.5	6.0
3	Hatchery incubation pool (Masonry/FRP structure)	2 (2.5 m dia x 1.2m height)	2 (2.5 m dia x 1.2m height)	4 (2.5 m dia x 1.2m height)
4	Hatchery Spawn collection chamber (Masonry FRP structure)	1 (3.0m x 1.5m x 1.5m)	1 (3.0m x 1.5m x 1.5m)	1 (3.0m x 1.5m x 1.5m)
Breeding and hatching hapas can be allowed as alternative to spawning pool, incubation pool, spawn collection chamber in hatcheries with less than 10 million spawn capacity or as a means to supplement production in higher capacities. Hatcheries producing spawn alone may be allowed to exist without nursery ponds/cement cistern.				
5	Hatchery Brood fish pond (water area in ha)	0.2 (depth 1.5-2.5)	Minimum 0.5 (Each pond not less than 0.2 ha & depth 1.5-2.5m)	Minimum 1.0 (Each pond not less than 0.2 ha & depth 1.5-2.5m)
6	Nursery ponds	10 (20m x 20m x 2m)	20 (20m x 20m x 2m) (Ten)	20 (20m x 20m x 2m)
7.	Land requirement	1 ha	1 ha	2 ha
8.	Qualified experienced person	1	1	1
9	Quarantine facility/ pond for new introduction	1	1	1



### C. Competence of Hatchery Manager /Farm manager/Operator/ Owner

Practicing farmer in fish seed production for two years / Qualified Professional from a recognized SAU/ Fisheries College or equivalent

### D. Assessment of Broodstock

1. For accreditation of hatcheries, an assessment of broodstock is done during the breeding season at least for three batches of the brooders.
2. General assessment is also done through random experimental netting of broodstock ponds
3. The following conditions need to be met in respect of broodstock

General health (Through visual examination)	a) Appear healthy b) Color and morphology- Species specific c) Actively swimming d) Should not have rashes, ectoparasites or symptoms of pathogenic infection.
Size	Not less than 2.0 kg in case of IMCs
Stocking Density in broodstock Pond	1000-3000 kg/ha.
Other conditions	a) Hybrid fish not used as broodstock ( <i>This is ensured through visual examination of morphological characters</i> ). b) Mixed breeding not be practiced. ( <i>This is verified through observation and genetic testing of seed. No F-1 hybrids or introgressed individuals should be present</i> ) c) In case, genetic testing of seed reports indicates inter-specific introgression or hybridization, the accreditation will be given only after screening and weeding of hybrid broodstock or complete replacement of broodstock.

### E. Assessment of Fish Seed

1. For the accreditation of seed farms, an assessment of seed is done for at least three batches of production at the spawn, fry and fingerling stage separately.
2. Fry and fingerling mixed in one pond should be considered as one batch.
3. The following standards are followed for determining the seed stages:

	Spawn (mm)	Early Fry (mm)	Fry (mm)	Advanced Fry (mm)	Fingerling (mm)
Indian Major Carps	Up to 8  1 ml spawn volume count is less than 600	9-25	26-50	51-100	>100

#### 4. Gross examination for health assessment

Screening for swimming and food acceptability	<p>Inactive seed should less than 5%</p> <p><u>Active</u></p> <p><i>Actively swimming in the water column</i></p> <p><i>Non-directional movement</i></p> <p><i>Ready acceptability / Immediate gulping of natural or artificial feed</i></p> <p><u>Inactive</u></p> <p><i>Surface and sluggish swimming</i></p> <p><i>Circular, range bound motion</i></p> <p><i>No inclination for feeding</i></p>
Screening for structural abnormality	<p>Structurally abnormal seed should be less than 1%</p> <p><u>Normal</u></p> <p><i>Straight curvature, distinctly differentiated into head, trunk and tail</i></p> <p><u>Abnormal</u></p> <p><i>Bend trunk and tail</i></p>
Screening for diseases	<p>No external sign of infection</p> <p>Negative test report for pathogens causing relevant diseases listed in Annexure IV (<i>Test to be conducted as per standard procedure laid and the test report needs to be enclosed</i>)</p>
Screening for genetic introgression and hybrids	<p>Negative report in visual examination of morphological features (<i>from fingerlings stage onwards</i>)</p> <p>Negative report in genetic testing to be conducted as per standard procedure laid and the test report need to be enclosed.</p>



#### **F. Operations and Record Maintenance of the Hatchery /Seed Farm.**

5. The assessments that are done during accreditation process must continue at the seed production unit after the accreditation is granted.
6. Proper record should be maintained to facilitate the claim that the seed produced from the hatchery is compliant to the norms of accreditation.
7. The seed production unit should document standard operating procedures and all the workers should be aware of the contents.
8. A Seed production unit should maintain the following records as applicable:
  - a) History of broodstock and replacement-of broodstock done from time to time
  - b) Breeding programme and production levels at spawn, fry and fingerling levels
  - c) Details of daily hatchery/farm activities (Test reports. of water quality to be done twice a year, for the parameters including pathogens as given above).
  - d) Assessment of parameters for seed quality (visual examination} as given above
  - e) Details of disease occurrence and mortality
  - f) Details of husbandry and management practices like feed, treatments etc,
  - g) Seed shipment details

#### 4.4 BENCHMARKS FOR ACCREDITATION OF ORNAMENTAL FISH SEED PRODUCTION UNITS

The level of expertise required in water quality management is higher for ornamental fish production than any other type of aquaculture, because of the variety and number of fish species. Ornamental fish industry at present mainly involves the fish species that are introduced in India and captive bred to cater to the domestic and export market. However, the units that produce seed for the fish species of indigenous origin should follow additional guidelines, which are given separately. The general guidelines that the ornamental fish hatcheries are expected to comply with, before they are accredited are given below. However, in view of the large variety of ornamental fish species that could have different management practices, the specific guidelines for a particular species may be framed through experts at the time of accreditation.

##### A. Water supply and quality

For Accreditation of ornamental fish hatchery, an assessment of water quality will be made twice a year with one report during the period of hatchery operation and the second after six months. Similar assessments at appropriate intervals are needed in case of seed farms. The following are the water supply and quality requirements of seed hatcheries and seed farms

Water	Requirement
1. Water supply	Adequate and from a regular and dependable source
2. Type of water source	Direct ground water ( <i>to be collected in open pond before pumping</i> )  Open water body such as rivers streams/ lake, etc( <i>to be allowed only if found to be free from any kind of pollution</i> )
3. Water quality	Free from algal blooms  Conforming to the parameters given in Annexure III ( <i>Test Report generated through standard test procedures need to be enclosed</i> ) Free from pesticide and heavy metal contamination ( <i>Analysis report is mandatory</i> ).  Free from pathogens ( <i>Negative report for pathogens listed in Annexure IV is necessary. Test report generated through standard test procedures needs to be enclosed</i> )

##### B. Infrastructure facilities:

The basic requirements for successful breeding and rearing of ornamental fish are adequate space, quality water and sufficient feed. Considering this, the following investments are required for starting an ornamental fish project.

Tanks: The tanks can be of RCC or brick masonry work having flat bottoms with inlet and outlet pipes. Clay, cement, fibreglass or plastic tanks can also be used. Rearing of fishes should be done in large tanks of suitable capacity.



Aquaria: Glass tanks of varying size are required for breeding purposes, Small glass bottles of 250 ml are used for keeping individual male fighter fishes. The number and size of the glass tanks depend on the specific breeding / spawning behavior of the species selected.

Overhead tank: An overhead tank of suitable size is required for storing water and to enable sedimentation.

Working Shed: Work shed should be designed in such a way that the tanks get filtered sunlight. Translucent HDPE sheets can be used as roof for this purpose. This also protects the culture tanks from falling debris, bird droppings, etc. Net screens are provided to adjust the light requirements.

Aeration equipment: A blower pump with network of tubes for aeration is essential. Continuous power supply should also be ensured through a standby generator set, UPS or Inverter.

### C. Assessment of fish seed.

For accreditation of the ornamental fish seed production unit, assessment of seed is done for atleast three production cycles at the spawn, fry and fingerling stage separately, Fry and fingerling mixed in one tank are considered one batch:

Screening for swimming and food acceptability	<p>Inactive seed should less than 5%</p> <p><u>Active</u></p> <ul style="list-style-type: none"> <li>• <i>Actively swimming in the water column</i></li> <li>• <i>Non-directional movement</i></li> <li>• <i>Ready acceptability/immediate gulping of natural or</i></li> <li>• <i>artificial feed</i></li> </ul> <p><u>Inactive</u></p> <ul style="list-style-type: none"> <li>• <i>Surface and sluggish swimming</i></li> <li>• <i>Circular, range bound motion</i></li> <li>• <i>No inclination for feeding</i></li> </ul>
Screening for Physical deformity	<p>Physically deformed seed should be less than 1%</p> <p><u>Normal</u></p> <ul style="list-style-type: none"> <li>• <i>Straight curvature, distinctly differentiated into head, trunk and tail</i></li> </ul> <p><u>Abnormal</u></p> <ul style="list-style-type: none"> <li>• <i>Bend trunk and tail</i></li> </ul>
Screening for diseases	<ul style="list-style-type: none"> <li>- No external sign of infection</li> <li>- Negative test report for pathogens listed in Annexure VII (<i>Test to be conducted as per standard procedure laid and the test report needs to be enclosed</i>).</li> </ul>
Screening for genetic introgression and hybrids	<ul style="list-style-type: none"> <li>- Negative report in visual examination of morphological features (<i>from fingerlings stage onwards</i>)</li> <li>- Negative report in genetic testing to be conducted as per standard procedure laid in Section 3.2 and the test report need to be enclosed.</li> </ul>

#### D. Assessment of broodstock

1. Stocking rates for breeding ponds vary greatly (50-100 per sq.m.)
2. For accreditation of hatcheries, assessment of broodstock is done during the period of breeding at least for three batches of brooders.
3. General health assessment is also done through random experimental netting and visual examination in broodstock ponds as follows:

General health (Visual examination)	<ul style="list-style-type: none"><li>• Appear healthy</li><li>• Color and morphology species specific</li><li>• Actively swimming</li><li>• No rashes, ectoparasites or symptoms of pathogen infections.</li></ul>
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#### E. Record Maintenance

1. The assessments that are done during accreditation process must continue even after accreditation is granted.
2. Proper record should be maintained to facilitate the claim that the seed produced from the unit is compliant to the norms of accreditation.
3. The unit should document standard operating procedures and all the workers should be aware of its contents.

#### 5. A Hatchery should maintain the following records:

- a. History of broodstock and replacement of broodstock done from time to time
- b. Breeding programme and production levels at spawn, fry and fingerling levels
- c. Details of daily farm activities, Water quality tested twice a year, for the parameters including pathogens as given above.
- d. Assessment of parameters for seed quality (visual examination) as given above
- e. Details of disease occurrence and mortality
- f. Details of husbandry and management practices like feed, treatments etc.
- g. Seed shipment details.



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**F. Additional requirements for hatcheries dealing with ornamental fishes indigenous to India.**

1. Hatcheries/farms producing the seed of India's indigenous species of ornamental importance need to be registered.
2. Ornamental fish seed production centers for indigenous species will be allowed only in respect of the species for which captive breeding protocols have been established and whose broodstock can be sourced from captive stock. For such centers, collection will not be allowed from natural resources.
3. For the species that are not being bred under captivity, centers shall be permitted selectively. These centers are registered separately with the purpose of developing breeding methodologies.
4. Such hatcheries should do explorations for broodstock following norms compliant to the Biological Diversity Act 2002 or any other regulations having relevance to natural resources.
5. Such centers need to have proven capacity, R&D facilities, by their own or in collaboration with other scientific groups.
6. Maximum number of specimens of a species that can be collected from the wild as brood stock will be 50 Pairs (This can be further reduced in case of threatened species)
7. These centres should agree to release at least 10 times of the collected number of broodstock (6 months' old, First Generation) to the same natural habitat under the supervision of the authorities.

#### 4.5 BENCHMARKS FOR ACCREDITATION OF SHRIMP HATCHERIES

##### A. Water Supply and Quality :

For shrimp hatcheries ( *P.monodon* and *L.vannamei*), the guidelines issued under CAA Rules,2005 and subsequent notifications ( \*\*) may be followed and in addition, for accreditation of hatcheries, assessment of water quality will be made twice a year; one during the period of seed production and the other after six months.

1. Water Supply	Dependable source of oceanic quality seawater
2. Type of Water Source	1. Open water source
3. Water abstraction and treatment facilities (depending on the requirements of the different sections of the hatchery).	<ol style="list-style-type: none"> <li>1. Sub-sand water abstraction</li> <li>2. Sand filtration (Gravity or Pressure) and bag filters</li> <li>3. Reservoirs for settlement and chlorination and dechlorination</li> <li>4. Activated carbon filter</li> <li>5. Cartridge filter</li> <li>6. UV filtration/ Ozonation - optional</li> <li>7. Independent water supply pipelines in duplicate for each unit - optional</li> </ol>
4. Water quality	<ol style="list-style-type: none"> <li>1. Optimal water quality characteristics (Annexure III). Enclose Test Report. Report to be generated through standard test procedures laid (section 3.1-viii)</li> <li>2. Free from pathogens causing relevant diseases listed in Annexure IV Enclose Test Report. Report to be generated through standard test procedures laid (section 3.1.viii)</li> <li>3. Free from pesticide and heavy metal contamination (Analysis report is mandatory).</li> </ol>

##### B. Infrastructure and Facilities

1. The infrastructure requirements given below are essential for a good biosecure shrimp hatchery. The entry and movement of viral pathogens in the system can occur through the shrimp broodstock and larvae, other vectors, water, feed, personnel, implements and pipelines, and transportation vehicles. The infrastructure and operating procedures that are evolved to prevent such entry and movement constitute the biosecurity.

(\*\*) Notification No. G.S.R. 740 ( E), dated 22-12-2005; Notification No. G.S.R. 695 (E), dated 30-4-2009 ;  
Notification No. G.S.R. 695 (E), dated 14-09-2012)



2. The infrastructure and facilities given below are only indicative and not exhaustive. Needs vary for different seed production facilities.
3. The appropriate levels of flexibility can be allowed at the time of verification, depending upon local circumstances, provided that the water quality; seed and other necessary assessment reports are compliant to the norms

### Physical Infrastructure and facilities

Other physical facilities include mainly buildings, water tanks and machineries (dependent on the production capacity of the hatchery).

#### Buildings

1	Independent buildings (With individual single entry point with provisions for footbath, hand-bath)	<ol style="list-style-type: none"> <li>1. Quarantine-individual holding facilities with dedicated diagnostic laboratory</li> <li>2. Acclimatization of quarantine-cleared broodstock</li> <li>3. Maturation</li> <li>4. Spawning and hatching</li> <li>5. Larval and nursery rearing</li> <li>6. Algal Culture Units- Indoor and outdoor a. (under translucent roofing)</li> <li>7. <i>Artemia</i> hatching</li> <li>8. Wet and Dry feed storage and testing laboratory</li> <li>9. Office/ storeroom/ staff quarters</li> </ol>
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#### Water Tanks :

	Hatchery capacity in million PL per year		
	50	100	200
Reservoir tanks (50-100t)	250t	500t	1000t
Overhead tank	10t	100t	100t
Maturation tank (10-15 t)	75t	150t	300t
Spawning tanks (250 lit)	10t	20t	40t
Larval rearing tank (10 t)	200t	400t	600t
Post-larval rearing tanks-Nursery rearing tank (25 t)	10 x 25 t	20 x 25 t	40 x 25 t
Algal cultural tank (10-20t)	25t	50t	100t
Number of <i>Artemia</i> hatching tanks	3 (100 liters)	4 (400 liters)	6 (400 liters)

### C. Assessment of Shrimp Seed

The quality of shrimp seed is generally tested at 3 levels:

- Level 1 Visual observation of animal and environment. The examination is based on gross features.
- Level 2 More detailed examination using light microscopy and squash mounts, with and without staining and bacteriology.
- Level 3 Use of Molecular techniques and immunodiagnostics. Considering the importance of various tests available and the requirements of shrimp farmers, the following tests have been accepted as minimum required for certifying a good quality seed suitable for stocking in ponds

Test	Brief protocol	Accepted levels for Good quality shrimp seed
MBV	By malachite green staining. Detection of occlusion bodies	100% Negative
WSSV	By nested PCR method. .  (Minimum 60 postlarvae to be taken for the PCR analysis)	100% Negative
Muscle to Gut Ratio (M G R)	Compare the thickness (Ventre-dorsal distance) of the mid portion of the sixth abdominal segment with the width of the gut at the same portion.	More than 80% of the animals tested (Minimum 10 animals) should have 4: ratio.
Body length (BL)	Distance between the tip of the Rostrum and the tip of the telson	More than 80% of the animals tested should be above 11 mm
Rostral spines	Number to be counted	80% of the animals should have more than five
General	Missing appendages	Should not be observed in more than 20% of the tested animals.

### Fouling Organisms

Test	Fouling organism	Should not be present in more than 30% of the animals tested
Stress test (100 animals each)	2. Reduction by 50% of the original salinity and allowing the animal without aeration for 1 hour.	Survival 90% and above.
1.Salinity 2.Formalin	3. The animals may be exposed to 200 ppm formalin for 1 hour without aeration.	Survival 90% and above.

Seeds, which pass the above tests at the levels indicated, can be certified as seed suitable for stocking. Seed which fail to pass the above testing should be discarded.



#### **D. Operations and Record Maintenance of the Hatchery.**

1. The assessments that are done during accreditation process must continue in the hatchery even after the accreditation is granted.
2. Proper record should be maintained to facilitate the claim that the seed produced from the hatchery is compliant to the norms of accreditation.
3. The hatcheries need to follow Standard Operating Procedures (SOPs) outlining the control protocols for the hatchery, described in a comprehensive document that covers each stage or process of the production cycle.
4. All the workers of the hatchery should be aware of the contents documented in the standard operating procedures and sign a document indicating that they have read and understood the SOPs, and that they will comply with all the requirements.
5. A hatchery should maintain the following records:
  - a. History of broodstock and replacement of broodstock done from time to time
  - b. Breeding programme and production levels at nauplii, post larvae levels
  - c. Details of daily hatchery activities, Test reports of water quality done twice a year, for the parameters including pathogens as given above.
  - d. Assessment of parameters for seed quality (visual examination) as given above
  - e. Details of disease occurrence and mortality
  - f. Details of husbandry and management practices like feed, health care; treatments etc.
  - g. Seed shipment details
6. Bio security programme for a shrimp hatchery must be implemented including elements
  - i. The use of quarantine areas for all incoming stock
  - ii. Screening of all incoming stocks for disease (i.e. through PCR or other immunodiagnostic technology)
  - iii. Treatment of all incoming water sources to eliminate pathogens.
  - iv. Sterilization and maintenance of clean equipment and materials
  - v. Personal hygiene measures including washing of hands and feet and clothing.
  - vi. Knowledge of the potential pathogenic diseases and the source of risk and methods and techniques for their control and/or eradication



## CHAPTER 5: CHALLENGES TO IMPLEMENT PROCEDURES OF QUALITY SEED PRODUCTION AND ACCREDITATION OF SEED PRODUCTION UNITS

The main challenges that accreditation process could face are as follows:

1. Seed production units in the country not very sensitive to the value of quality seed and the implications of not using quality seed on the industry and environment
2. Genetic contamination due to the practice of mixed spawning of Indian Major Carps in hatcheries. (This can be prohibited, but still the practice may continue due to limitations of time and space in hatcheries)
3. Difficulties in monitoring the history of broodstock, due to inadequate knowledge even in large farms
4. Difficulties in identifying the indirect checkpoints to monitor the- flow of uncertified seed
5. Difficulty in checking the seed production activity of backyard type, which are known to use contaminated water source. *(Stopping this will affect seasonal livelihood of small producers. Alternates need be found through providing financial assistance to upgrade the small hatcheries' quality standards. This means encouraging the small producers to follow the norms or to allow them to develop group/ cooperative hatcheries that can be accredited)*
6. Inability of producers who involve in seed production only, as seasonal ventures to get accreditation as they have no broodstock in their farm for evaluation. *(Broodstock sources at regional level can be established/ recognized. State owned aquaculture farm can also be certified for the purpose. Such farms can maintain pure line foundation broodstock that can be used to produce certified broodstock and also to be provided to the users. Milt bank facility can be created to obviate the need to raise large brood stock. This will also safeguard domesticated elite germplasm which can provide sperm source if adequate milt is not available at some farms).*
7. The prescribed requirement will enhance the costs of the seed production in the accredited seed production centres. This coupled with the possible slow uptake of the certified seed and competition from uncertified seed, might adversely impact the profits of accredited units; at least, in the first few years, leading to low operating margins or even losses. *(Availability of easy insurance cover to the accredited seed/ broodstock center will encourage seed producer to come forward for accreditation. Subsidies/ financial loans, whenever given should be limited to the farms that use certified seed)*
8. The present diagnostic indices and norms with respect to germplasm quality, disease and environment parameters are inaccurate
9. Possible litigation when certified seed does not perform as expected *(Many times poor performance are due to reasons other than seed quality such as lack of specific management conditions at the farm of grow-out culturist. The optimum performance of certified seed will be ensured only under specified condition)*



10. The present considerations are applicable only to those species for which aquaculture practices have been established. Thus, certification process needs to adopt a futuristic view with options open for new species, both indigenous and introduced. Some of the species for which accreditation process may be required in the near future are Sea bass (*Lates calcarifer*), pearl spot (*Etroplus suratensis*); Sea cucumber (*Holothuria scabra*), Edible oyster (*Crassostrea madrasensis*), Pearl oyster (*Pinctada fucata*), Pearl mussel (*Lamellidens marginalis*); Indian Featherback (*Chitala chitala*), and Indian and exotic trouts.
11. The exotic species/strains introduced without passing through the official channels will be a critical risk to the entire certification process.

## FISH SEED CERTIFICATION AND ACCREDITATION CONCEPT

### 2.1 Purpose

For setting quality standards for fish/fin fish seed in India and ensuring that their production process conforms to norms of environmental sustainability and social equity.

### 2.2 Scope

The Accreditation and Certification systems will be applicable to all hatcheries and seed production units in India- under both private or public sector that undertake breeding of fish and finfish and nursery rearing and transport of spawn, fry, fingerlings, nauplii and post larvae.

### 2.3 Principles

The proposed Body/Agency and its activities will be guided by a set of principles as described below. The process will be:

- based on best scientific evidence available
- consistent with the national policies on environmental sustainability and social equity
- based on minimum substantive requirements, criteria and procedures. that will be outlined in the guidelines
- transparent including balanced and fair participation by all stakeholders involved
- non-discriminatory and not creating any unnecessary obstacles for free trade and enterprise
- establishing clear accountability for owners of hatcheries/seed production units as well as the certifying/accrediting authorities
- incorporating reliable independent auditing and verification procedures

### 2.4 Definitions

**Accreditation:** A procedure by which a competent authority gives formal recognition that a qualified firm /facility is competent to carry out a specific task (s)

**Certification:** A procedure by which a body/an organization recognized by the accrediting agency gives written assurance that a product/ process/ facility/ service of hatchery/firm/facility conforms to specific requirement. Certification may be based on range of inspection activities, including if needed, a continuous inspection in the production system.

*(The Authorized Accreditation Agency can engage/authorize a or several Certification agencies as required or can have its own certification machinery)*

**Hatcheries:** Hatchery is a production unit that produces seed material at the earliest stage of life cycle such as spawn, eyed ova (finfish) and nauplii (shrimps and prawns) or equivalent stage, specific to a species through breeding or incubation of berried female; or any other established method of producing progeny of a species.



Seed farms: Farms that raise fry and fingerling (finfish) and post-larvae (shrimps and prawns) to stock aquaculture farms (Initial seed material ought to be procured from accredited hatcheries).

(A "Seed production unit" can be a Hatchery, a Seed farm or a unit with both the components)

Certified seed: Certified seed is the progeny of the broodstock, produced by an accredited hatchery or fry raised by an accredited seed farm and certified by the producer that their produce (seed) is compliant with the specified norms, The certified seed shall be used only for culture as table fish/shellfish and not for- raising broodstock,

## 2.5 Qualities required for an Accreditation body/Agency \*

Independence, impartiality and transparency The Accreditation body/Agency should be independent and impartial. In order to be impartial and independent, the accreditation body should:

- be transparent about its organizational structure and the financial and other kinds of support it receives from public or private entities
- be independent from vested interests together with its senior executive and staff
- be free from any commercial financial and other pressures which might influence the results of the accreditation process
- ensure that decision on accreditation is taken by person (s) who has (ve) not participated in the assessment
- not delegate authority for granting maintaining extending reducing suspending or withdrawing accreditation to an outside person or body.

Accountability and reporting The accreditation agency should be a legal entity and should have clear and effective procedures for handling applications for accreditation procedures. In particular, the accreditation body should maintain and provide to the applicants:

- a detailed description of the assessment and accreditation procedure
- the documents containing the requirements for accreditation
- the documents describing the rights and duties of accredited and accrediting bodies should conduct periodic audits

Resolution of complaints The accreditation body should have a written policy and procedures for dealing with any complaints in relation to any aspect of the accreditation, de-accreditation or certifying process. It should keep a record of all complaints and remedial actions relative to accreditation

## 2.6 Seed Certification Process through Accreditation of Hatcheries

A seed used in any aquaculture system is an early life form of the organism, actively swimming and growing. Barring a few exceptions such as *Artemia*, there are no dormant stages as in agriculture crops. Therefore, testing every batch of seed produced at the hatcheries is not feasible. Accreditation of hatcheries to produce certified seed would be a more practical approach. In other words, process certification i.e. certification of hatchery management practices is considered a better way than the product certification alone.

Testing of seed for compliance to the norms would be part of the hatchery accreditation procedures.

## **2.7 Requirements**

The following are the three basic requirement for initiating the process of fish seed certification and accreditation process in India

- Identification of fish species/varieties used in aquaculture with hatchery-bred seed
- Appropriate guidelines for accreditation of hatcheries and seed farms
- Empowered agency/authority for accreditation of hatcheries and seed farms, equipped with required technical manpower, diagnostic and analytical capabilities.



**1. CARPS**

*Definition:* Fish species belonging to the family Cyprinidae. They are of five categories:

Category I (domesticated): Indian major carps (IMCs), *Catla catla*, *Labeo rohita*, *Labeo calbasu*, and *Cirrhinus mrigala*. Minor carp: *Labeo bata*, Chinese carps: *Cyprinus carpio*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *P. gonionotus*.

Category II (not yet domesticated) : *Labeo gonius*, *Labeo fimbriatus*, *Labeo dero*, *Labeo dyocheilus*, *Labeo dussumieri*, *Puntius surana*, *P. pulchellus*, *Cirrhinus cirrhosa*, *Cirrhinus reba*, *Barbodes carnaticus*, *Gonoproktopterus curmuca* or any other commercially important carps that might be considered in future, when their aquaculture protocols are established

Category III (Hybrids): Female catla x male rohu (Nadán) or any other hybrid developed through captive breeding of the parents between two different taxonomic entities and released as hybrid variety for aquaculture purposes.

Category IV (Improved Variety/ Imported strains): Genetically improved variety, developed through breeding programme from parents of the same species and released for commercial Culture (example 'Jayanti' rohu developed by selective breeding at CIFA)

Category V (IMC Seed): Spawn- upto 8 mm (yolk sac completely absorbed); Early fry 9-25 mm, Fry 26-50 mm; Advanced fry 51-100 mm; Fingerling > 100 mm

**2. CATFISHES**

*Definition:* Fish species belonging to the order Siluriformes.

**Species Cultured in India**

At present two air breathing catfishes are cultured in India on commercial basis. They are:

*Clarias batrachus* (magur; family Clariidae) and *Heteropneustes fossilis* (singhi; Family Heteropneustidae).

Seed size: 15-20 mm (fry)

*Pangasius pangasius*, *Ompok* sp., and *Horabagrus brachysoma* are prospective cat fish species that might be considered for culture in future, when their aquaculture protocols are established.

### 3. FRESHWATER PRAWNS

*Definition:* All decapod crustaceans under the family Palaemonidae.

#### Species Cultured in India

*Macrobrachium rosenbergii* is the freshwater prawn cultured widely in India.

Seed size: > 30 mm

*M. gangeticum* and *M. malcomsonii* are the other prospective freshwater prawns that might be considered for culture in future when their aquaculture protocols are established.

### 4. ORNAMENTAL FISHES

*Definition:* Aquatic species that have commercial value as a live display or exhibition item:

Their value could be due to appearance, color, shape or any other morphological and behavioral trait. They include a number of fin fishes and other aquatic organisms, which are kept as pets or displayed and are not typically used as a food source for human or livestock. Ornamental fishes are of fresh water, brackishwater or marine origin.

### 5. SHRIMPS



*Definition:* Decapod crustaceans belonging to the family Penaeidae.

### Species cultured in India

The main cultivable species of penaeid shrimps are the giant tiger shrimp, *Penaeus monodon*, the Indian white shrimp, *Fenneropenaeus indicus*, the banana shrimp, *F. merguensis* and *Penaeus semisulcatus*.

### Seed

*Nauplii:* In shrimps, the eggs hatch out into nauplii, which have three pairs of appendages. There is no mouth and the nauplii thrive on the nutrients stored in the egg.

*Postlarvae (PL):* The nauplii pass through intermediary larval stages of Zoea and Mysis and reach Postlarval stages in 9-10 days. The postlarvae of shrimp have all the morphological characteristics of the adult. Postlarvae are designated based on the number of days spent as PL. PL<sub>15</sub> means PL of 15 days old. PL<sub>15</sub> to PL<sub>20</sub> are suitable for stocking in farms.

## OPTIMUM WATER QUALITY PARAMETERS

\*

### 1. For Carps/ Air-Breathing Fishes/ Ornamental Fishes

Parameters		Optimal levels
Water temperature (°C)	=	24.0 - 29.0
pH	=	7.6 - 8.4
DO (mg/l)	=	> 5
CO <sub>2</sub> (mg/l) -	=	<16.0
Total alkalinity (mg/l)	=	80.0 - 110.0
Hardness (mg/l)	=	70 - 100
Ammonia-N (mg/l)	=	< 0.2
Potassium (mg/l)	=	> 1.0
Calcium (mg/l)	=	24.0 - 28.0
Sodium (mg/l)	=	7.9 – 9.0
Iron (mg/l)	=	< 0.2
Traces of Pesticide	=	As per CPCB standards for bathing water
Heavy metals	=	As per CPCB standards for bathing water H <sub>2</sub> S
	=	<1.0
Chloride	=	<10 mg / litre

*(Note: Direct use of ground water may not be suitable. It is to be drawn first to earthen intake ponds before use in hatchery complex for breeding /incubation purpose, using appropriate filter)*



## 2. For freshwater prawn

Parameters	Optimal levels
Water temperature (°C)	= 27.0 - 31.0
pH	= 7.6 - 8.4
DO (mg/l)	= > 5
Ammonia-N (mg/l)	= < 0.1
Nitrite--N (mg/l)	= < 0.01
Iron (mg/l)	= < 0.2
Salinity	= 12-14 ppt
Pesticide Traces	= As per CPCB standards for bathing water
Heavy metals	= As per CPCB standards for bathing water
H <sub>2</sub> S	= < 1.0
Chloride	= < 10 mg / litre

## 3. For Shrimp

Parameters	Optimal levels
Temperature (°C)	= 28-32
Salinity (ppt)	= 30-34
pH	= 8.0 - 8.4
Dissolved oxygen (mg/l)	= > 4.0
Pesticide Traces	= As per CPCB standards for bathing water
Heavy metals	= As per CPCB standards for bathing water
Ammonia- N (mg/l)	= < 0.01
Nitrite - N ( mg/l)	= < 0.01



## SCREENING FOR PATHOGENS AND DISEASES (As per NSPAAD\*\* List)

### (i) Fish Diseases

1. Epizootic haematopoietic necrosis
2. Infectious hematopoietic necrosis
3. Spring viraemia of carp ( SVC)
4. Viral haemorrhagic septicaemia (VHS)
5. Epizootic ulcerative syndrome (EUS)
6. Red seabream iridoviral disease (RSID)
7. Koi herpesvirus disease ( KHV)
8. Grouper iridoviral disease
9. Viral encephalopathy and retinopathy
10. Enteric septicaemia of catfish
11. Infection with *Aeromonas hydrophila*
12. Infection with *Edwardsiella tarda*
13. Infection with *Vibrio anguillarum*
14. Infection with *Flavobacterium columnare*
15. Infection with *Streptococcus iniae* in Tilapia
16. Infectious pancreatic necrosis ( cold water)
17. Infection with *Myxobolus* spp.
18. Infection with *Ichthyophthirius multifiliis*
19. Infection with *Saprolegnia parasitica*
20. Infection with *Argulus* spp.
21. Infestation with *Dactylogyrus* spp.
22. Infestation with *Lernaea* spp.
23. Infestation with *Calligus* spp.

### (ii) Crustacean diseases

1. Taura syndrome (TS)
2. White spot disease (WSD)



3. Yellowhead disease (YHD)
4. Infectious hypodermal and haematopoietic necrosis ( IHHN)
5. Infectious myonecrosis (IMN)
6. White tail disease ( MrNV)
7. Necrotising hepatopancreatitis (NHP)
8. Milky hemaolymph disease of spiny lobster ( Panulirus spp.)
9. Monodon slow growth syndrome
10. Acute hepatopancreatic necrosis syndrome (AHPNS)
11. Hepatopancreatic parvovirus
12. Monodon baculovirus
13. Loose shell syndrome
14. Soft shell syndrome
15. Gaffkemia

(\*\*) *National Surveillance Programme on Aquatic Animal Diseases*

# STANDARD APPLICATION FORMAT APPLICATION FOR ACCREDITATION OF A HATCHERY/SEED FARM

1. Name and address of the hatchery/Seed farm :

Phone No. :

Fax :

E-mail :

2. Ownership :

A. Govt./ Society/ Individual/Private-Limited Company/Corporate House

B. Commercial registration (Reg. No. & Date)

3. Year of establishment :

4. Location of the hatchery/Farm

Village :

Taluk :

Nearest Police Station :

Nearest Railway Station :

District and State :

5. Farm details

A. Total Land Area (ha) :

B. Total water area (ha) :

C. Land (ha): (Own/On lease/Others- specify) :

D. Rearing space

(i) Broodstock ponds (No./area) :

(ii) Nursery ponds (No. /area) :