Aquaculture Field School

Step by step Toolkit for Facilitators

ICAR-Central Institute of Freshwater Aquaculture
Indian Council of Agricultural Research
(An ISO 9001:2015 Certified Institute)
Kausalyaganga, Bhubaneswar, Odisha 751002

Published by
Director
ICAR-Central Institute of Freshwater Aquaculture,
Kausalyaganga, Bhubaneswar, Odisha, India

www.cifa.nic.in

email: director.cifa@icar.gov.in
Telephone: +91-674-2465421
Fax: +91-674-2465407

Citation:
Saha G. S., H. K. De, P. C. Das, I. Sivaraman (2020). Aquaculture Field School- Step by Step Toolkit for Facilitators. ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar

Aquaculture Field School

Step by Step Toolkit for Facilitators

Dr G.S. Saha, Dr H.K. De, Dr P.C. Das, Dr I. Sivaraman

Contents

Part-I

Aquaculture Field School Methodology, Principles and Concept

BANAPUR AQUACULTURE FIELD SCHOOL

The first AFS was established at the Maharatha's Aquavariant Estate, Bhatpadagarh, Banapur in the Khordha district of Odisha. The owner Shri Manabendra Maharatha owns 10 ha water body spread over 27 fishponds of different size. Besides the farm, he also has one carp hatchery. He has been in this carp seed business since 2003. With technical support from ICAR-CIFA, the farm now produces around 10-15 crores carp spawn, 1-2 crores carp fry, 8-10 lakh fingerlings and 3-5 tones yearlings every year. From a situation of no fish seed in the locality, the farm could become a popular fish seed supplier for the neighbouring seven districts of Odisha.

Farmer field school (FFS) approach was promoted by FAO as an alternative technology dissemination mechanism to the top-down extension methods in south-east Asian countries. The mechanism was found to be successful where the farming situations were more complex and counter-intuitive problems existed. FFS aims to increase the capacity of groups of farmers to test new technologies in their fields and to assess the relevance of results to their particular circumstances.

In order to utilise the potential of the FFS approach for aquaculture, ICAR-CIFA has piloted the Aquaculture Field Schools (AFS). AFS is a school without walls for improving the decision-making capacity of the farmers and facilitates cross learning opportunities. It is a participatory extension approach whereby fish farmers are allowed to choose the methods of aquaculture production through discovery-based approach. AFS is composed of a group of like-minded farmers who regularly meet and discuss the technical aspects of fish farming. Ideally, 20-25 farmers make an AFS.

Aquaculture Field Schools promotes farmer to farmer extension. It eases the pressure of an already overstressed public sector aquaculture service delivery system. The vision inherent in aquaculture field schools is that the trainers work alongside farmers as advisors and facilitators, encouraging independence, analysis and organization. This method promotes exploration, discovery and adaptation under local conditions. The researchers and workers are looking to help them where they are unable to solve a specific problem amongst themselves.

There are three primary objectives in the AFS. That are:-

1. To empower the aqua-farmers with knowledge and skills to make them experts in their fields
2. To sharpen the fish farmers' ability to make informed decisions that renders their farming profitable and sustainable
3. To help fish farmers learn how to organize themselves and their communities

It is imperative to integrate the curriculum of different steps in scientific aquaculture into the AFS mechanism. So that the field schools can cover a wide area where the progressive farmers are there and through them the technology of fish culture like culture and seed production of carp, catfish, and air-breathing fish, ornamental fish are disseminated.

ICAR - CIFA piloted Aquaculture Field Schools (AFS)

The AFS initiative was started as an institute funded project during 2008-09. As an outcome of the project, two field schools were established in Odisha during 2009-10. Three more AFSs were added in the subsequent years. In all the AFS, a progressive farmer was identified and transformed to be the facilitator. Scientists of the Institute had regular interactions with AFS facilitators and provided proper technical backstopping to develop the aquaculture enterprises.

SARAKANA AQUACULTURE FIELD SCHOOL

The second AFS was established at Sarakana, Khordha district of Odisha in the farm jointly owned by Shri Batakrushna Sahoo and Shri Hrushikesh Panda. This fish farm has 6 ha water area comprising 23 ponds. There are two large eco- hatchery for carps,one freshwater prawn hatchery and one ornamental fish breeding unit in this farm. Pond embankments are used for horticultural crop production including floriculture. Shri Sahoo and Shri Panda have been engaged in fish seed production business since 1986. It is one of the pioneering farm to successfully breed Indian Major Carp (IMC) as early as in March with adoption of latest technology in the form of CIFA BROOD™. Shri B. Sahoo is an innovative farmer recognized at State as well as at National level, trained thousands of aquafarmers through The AFS. Recently in 2020, Shri Sahoo has been bestowed upon the prestigious 'Padma Shri' and the award is presented on the Republic Day.

DURG AQUACULTURE FIELD SCHOOL

The third AFS was established at Tirga in Durg district of Chhattisgarh at M/s Poonam Fisheries owned by Mr. Surendra Belchandan. The farm was established in 2013. This farm was developed in 50 acre of area. Shri Belchandan has taken leading role in development of a fishery group in and around his village with more than half dominated, mostly by tribal fishers. He also has a feed mill. He has adopted latest technologies of CIFA like fish hydrolysate and using the same for fertilizing crop fields and fish ponds.

Impact of Field Schools

The AFS piloted by ICAR-CIFA is the first of its kind in the field of aquaculture. There are FFS on Integrated Pest Management, rice and several other technologies which are promoted by National Food Security Mission and are implemented by line departments of the states as well as Krishi Vigyan Kendras. The AFSs have brought a large number of visitors from Odisha and other parts of the country. So much so that the Commissioner of Fisheries, Odisha and other senior officers visited the AFS and appreciated the efforts of ICAR-CIFA and the facilitator farmer. Several field days and workshops on community-based aquaculture have been organized at the AFS which were attended by farmers from neighbouring villages. Post-graduate students from Fishery Science are also regular visitors to these fields schools for practical exposures. Several other researchers have documented the positive impact of these field schools.

The FFS approach represents a paradigm shift in agricultural extension and can be viewed as a capacity-building investment in the sector of education, information and training. Key strengths of the FFS approach can be broadly categorized as the enhancement of human and social capital and a key entry point for new practices and technologies (Watson, 2008). Within a short span of their establishment, all the AFSs have proved to be the ground for new, meaningful and participatory learning about the scientific practices in aquaculture. Farmers' practical problems are regularly being analyzed, their capacity enhanced and qualitative decision making ability strengthened through these field schools.

The AFS approach relies heavily on non-monetary inputs mostly in the form of technical advice and interaction as the primary intervention. Sharing of experiences with the lead farmer at the AFS helps in bringing confidence among them in scientific fish farming. This approach of 'farmer to farmer' extension with no physical input would certainly be sustainable in the long run (De et al. 2016). It is suggested that the AFS be established in each district enabling the lead farmer to meet the information requirements of fellow fish farmers effectively.


रोहू, मृगल, कतला का बीज उपल


Fish Vita

BAISINGA AQUACULTURE FIELD SCHOOL

The fourth AFS at the Kailash Hatchery at Baisinga in the Mayurbhanj of Odisha was established on 2017. It is operated by two brothers Akshaya Sahu and Abhaya Sahu. They have adopted the latest technologies of ICAR-CIFA as well as many farm level innovations to improve their productivity. Besides their own farm area, they have taken several more ponds in the locality on lease basis and the total area of operation comes to 100 acres. The farm has the rare distinction of producing almost all the major cultured species of Odisha including freshwater prawn. Around 20 species of freshwater aquaculture with the production capacity of 200 crores and fry rearing capacity of 20 crores.

OUTLINE

Phase 1: Preliminary Activities

Step 1. Conduct a preliminary survey

Step 2. Training of Facilitators

Step 3. Awareness program on AFS concept

Step 4. Select the participants & finalise the learning site

Step 5. Establishment of AFS

- a. Establishing the AFS group
- b. Problem analysis and ranking
- c. Identifying potential solutions
- d. Developing the learning module
- e. Developing a detailed budget
- f. PM & E plan

Phase 2: AFS implementation

Step 1. AFS sessions with core activities

Step 2. Aquaculture Field days

Step 3. Exchange visits

Step 4. Graduation

Phase 3: Post-graduation

Step 1. Follow up of AFS activities

Step 2. Establish/create AFS networks

Part-2

Organising an Aquaculture Field School

Phase 1 Preliminary Activities for the AFS establishment

Step 1. Conduct a preliminary survey

A preliminary survey has to be conducted in the prospective locality to understand the nature of the fish farms and explore the scope of starting an AFS.

The following points to be considered during the survey:

- No. of fish farmers in the locality
- Availability of the AFS training facilitators
- Support of the government extension agencies
- Possibilities of funding support for the AFS operations

Who is a facilitator?

The facilitators, who guide the farmers, should adequately be trained by non-formal education methods about the basic principle of aquaculture. He/She should know the cost-effective and sustainable protocols for fish production and manage the farmers' problem. Additional training on specific topics (technical and methodological) to be organized in order to develop their capacity further.

Guidelines to be followed while selecting the AFS facilitators

1) Primarily the AFS facilitators should be innovative in nature. They should be the first to adopt the newer technologies in the sector.
2) They should have the peer recognition and social influence in the society. The fellow farmers should endorse him/her as the mentors in the farming enterprises.
3) They should be ready to help and share the knowledge with the fellow farmers.
4) They should have active linkages with technical institutions and development departments (Department of Fisheries, ATMA etc.).
5) The location of the AFS farm should be easily accessible to neighbouring villages.

Technical backstopping

A technical institution like ICAR-CIFA/Subject Matter Experts from KVK/ Colleges should be linked with the AFS. This would ensure a constant technical backstopping and updated information from the Institutes. The Institutes will also be able to monitor them properly.

Step 2. Training of Facilitators

A facilitator is a person who has been trained and has hands-on experience to guide the fellow farmers. The facilitator has the role of creating conditions for farmers to learn through observations and analyze what they experience. He should encourage farmers to take an active role in their learning process.

Step 3. Awareness program on the AFS concept

An awareness- meeting should be conducted and the need of creation of the AFS should be briefed to them.

Step 4. Select the participants & finalise the learning site

Identify and select like-minded farmers who are willing to participate in the AFS and share knowledge with other farmers.

The following points are considered to choose the participant farmers.

- All participants should live within a relatively short distance of the AFS learning site.
- The participant should be the decision-maker of the farm.
- Aquaculture as their primary source of income.
- There is no discrimination based on educational and socioeconomic levels.
- The participant must be willing to attend all sessions during the AFS schedule.
- The participant should be interested in learning and not expect material benefits.
- There are no known conflicts between participants.

Identification of learning site -

The AFS is a 'School without walls', and the field is the primary learning tool. Farmers learn directly from what they see, collect and experience, and not from a textbook, pictures or other extension materials. The advantages of learning in the field are that the materials are entirely relevant to local conditions, and the problems are recognised and owned by the farmers.

Always carry out site visits to compare possible sites and examine the feasibility, and prepare site designs for the selected enterprises as well as for the learning site. Check the soil and water characteristics. If these are identified as too poor to support the selected enterprise, advise farmers not to select the land as the host farm. Democratically select the host farmer to avoid unnecessary group conflicts in the future. Identify farmers who live in an area with easy access for the majority of the group members and helps to maintain group activities.

Visit proposed sites to confirm availability of the water bodies and suitability of size and shape for the selected enterprises and learning site.

Step 5. Establishment of AFS

1. Establishing the AFS group

The AFS group should have an identified and organized structure and the resources to work effectively. The technology packages should properly be delivered at the farm sites to the farmers and strengthen them to work as a whole and mobilize the other farmers to do the aquaculture practices by facilitating them understand the profit aspect of the fish farming.

2. Problem analysis and ranking

- Group exercises with the help of participatory rural appraisal tools to identify problems, constraints and opportunities
- Record baseline information about members
- Assessment of existing farming practices, perceptions and factors influencing decisions

- Identification of farmer's expectations

3. Identifying potential solutions

According to the ranking done through PRA, the crucial problems should be addressed first. Farmer's expectations should be addressed through improved technology and knowledge dissemination.

4. Developing the learning module

The module will be developed according to the requirement of the farmers. So far as aquaculture is concerned, the modules in the AFS may be based on hatchery management, seed production, grow-out culture and integrated fish farming with various crop component as per the farmer's choice.

5. Developing a detailed budget

A detailed budget for implementing the module, including the cost of input and other related expenditure for demonstration, will be developed.

Financial requirements for establishing AFS

One of the fundamental tenets of Field School is that farmer's farm is the school. It has no walls. So going strictly by the philosophy of Field School, there is no need for any physical facility to be created for AFS. However, for running the Field School, there would be certain expenditure, which may be arranged through sponsor. For example, ATMA Khordha regularly sponsors the Field School activities at AFS Sarakana. About Rs 30,000/- is allotted for each field school and the funding support is utilized for conducting the demonstrations, six sessions including one field day; honorarium to the expert/resource person; refreshment and stationery etc. So while planning for an AFS, convergence opportunities should be explored for the necessary funding support.

6. PM & E plan

To successfully implement the AFS approach, both the participants and facilitator must continuously assess whether they are making positive changes and achieving the goals they have set.

Participatory monitoring and evaluation (PM&E) methodology have been developed to help AFS practitioners actively observe and analyze the AFS situations and performances.

Phase 2 AFS Implementation

Step 1. Preparing the AFS sessions with core activities

The AFS members will agree on a starting date, the frequency of meetings and the length of the cycle with the facilitator. The activities will have to be prepared, and the participants should understand the need for weekly meetings of 3-4 hours. Accordingly, the activities have to be planned and the farmers are required to comply to the meeting schedule.

Step 2. Organisation of the Aquaculture Field days

Aquaculture Field days are educational events held at farm site and hosted by the facilitator farmer. The events usually include demonstrations of specific management practices in the fish crop cycle. Audiences can include fellow fish farmers, development workers, etc. The field day can include presentations, posters, materials and walks through the fields. During the operation of the AFS, aquaculture field days are organized where the rest of farming communities are invited to share what the group has learned from the AFS.

Step 3. Exchange visits

Exchange visits should be organized to know the activities and performance of other AFS groups and facilitators. Opportunity should be provided to the members to undertake self-evaluation as compared to the host AFS. Exchange ideas, techniques and methodologies should be facilitated between AFS groups and facilitators.

Step 4. Graduation

The "Field Day" and the "Graduation" are essential aspects of the AFS expansion strategy. These two events entail inviting non-AFS neighbors to view the results of AFS members. Frequently the neighbouring farmers, who attend these events request their AFS and copy what they see in the field. This programme marks the end of the aquaculture activities for the particular season.

Phase 3 Post Graduation

Step 1. Follow up of the AFS activities

Follow-up is a way to accompany learners from being recipients of learning activities to actively utilize these new skills and knowledge to act as active agents of change in their environments. The development agency which facilitates the AFS expansion should undertake a regular follow-up exercise to keep a track of the sustainability of the AFS process.

How do we provide follow-up support?

The kind of follow-up support depends on the needs of learners and the objectives of the initiative. Valid forms of follow-up support include:

- Regular follow-up visits may be undertaken. Regular follow-up support, on demand contact session, refresher courses in-person or online
- Technical assistance through ICT tools like WhatsApp Toolkits and web-based modules for continued reference

Step 2. Establishment / creation of AFS networks

As the number of AFSs grow and alumni groups broaden their level of operation, new issues and challenges would emerge that cannot be solved effectively by the individual groups. Hence, efforts should be made to facilitate the experience sharing among the AFSs through knowledge sharing so as to popularise the best practices experienced by the farmers.

Part-3

AFS Learning Module
Carp grow out culture

GROW OUT CARP CULTURE

Learning Activity 1: Pond preparation

Learning Outcome:

Participants are expected to gain knowledge on the importance of pond preparation before fish stocking and how to prepare a newly excavated pond or an old pond according to their requirement of seed rearing or grow-out culture.

Time: One hour

Steps : Preparation of newly excavated pond -

1. Pond area should be at least 0.5 acres with water depth 1.5-2 m.
2. The new pond should be filled with at least one-foot water.
3. Raw cow dung is applied uniformly at approximately 1200 kg/ acre throughout the pond followed by mixing by a leveler. Beside supporting an organic matter base for pond productivity, the cow dung application will enhance the water retention capacity of the soil.
4. This is followed by addition of water up to 1.0-2.0 m depending on the requirement (seed rearing/grow-out).
5. The pH of soil from the pond bottom should be tested. Soil pH within 6.5-7.0 is good and supports to maintain the ideal water pH in 7.5-8.5. Lower soil pH needs to be treated with higher amount of lime (400-800 kg limestone after making it to powder/acre depending on the pH value).
6. Extra lime is required if the pH of the pond soil is less than 6.0. After 3-4 days of lime application, plankton inoculation is done which can be done by collecting plankton from a nearby old pond.

Preparation of old pond -

1. Weed control: A wide range of manual, mechanical, chemical and biological methods available for control of these weeds, generally the manual method is commonly advocated for weed clearance because of no time requirement for detoxification as in herbicide use.
2. Eradication of unwanted fishes: Dewatering followed by sun-drying the pond is the most effective methods adopted for the eradication of predatory and weed fishes.

Other methods for removal of these fishes include

a. Mahua oil cake @ 1000 kg/acre/1 m water depth
b. Bleaching powder (33% Chlorine) @ 140 kg/acre/1 m water depth
c. Application of urea @ 40 kg/acre/1 m water depth followed by bleaching powder (33% Chlorine) @ 70 kg/acre/1 m water depth and after 18 hours.

3. Fertilization is carried out in the pond 4-5 days before fingerling stocking with a basal application of 1200 kg/acre of raw cow dung mixed with SSP @ 10 kg/t of cow dung.
4. Application of poultry manure at 400 kg/acre-m also ensures adequate plankton growth and can be used as substitute of cow dung for pond preparation by the time of seed stocking.
5. Basal application of cow dung is skipped when mahua oil cake (@1.0 t/acre) is used as piscicide. Post-stocking fertilization is carried out with the alternate weekly application of manure (200 g cow dung/ acre-m) and inorganic fertilizers (4 kg urea and 6 kg SSP per acre-m) for continuous and sustained availability of nutrients for plankton growth.
6. Though the above dosages are usually prescribed for regular maintenance of pond productivity, hydro-biological conditions prevalent in pond water should always be considered before every fertilization.

Learning Activity-2

Stocking and Cropping pattern

Learning Outcome :

Participants will gain knowledge about the species to be stocked, the ratio to be maintained, the stocking size of the fingerlings and the cropping pattern to be followed.

Time: One hour

Steps

1. Size of seed

Normally fingerlings are cultured for getting table size fish. Nowadays 100-300 g of juveniles are also used for harvesting table size fishes within 4-6 months.

2. Cropping pattern

a. Usually, four types of cropping models are followed in carp culture based on the intensity of management i) single stocking-single harvest (SSSH), ii) single stocking-multiple harvest (SSMH) and iii) multiple stocking-multi harvests (MSMH) and multiple cropping(MC).

b. The stocking density and species combination of the carps also vary according to the cropping models. While the usual stocking density followed in the SSSH is 3200-4000 fingerlings/acre, the density may be increased to one and half times in SSMH cropping pattern to harvest almost 50% of the stock after six months of culture.

c. In case of MSMH cropping pattern (also known as continuous culture), the stocking density followed is same as that of SSSH (8000-10000/ha), but the larger sized seed (50-100 g) are generally used for stocking. Partial harvest of bigger fish is carried out periodically from sixth month on ward with those reaching to marketable size, followed by replenishment of harvested number after every harvest so that the number of fish in the pond always maintained approximately at same density after mortality of the newly stocked fish. An ancillary seed pond is usually kept along with the grow-out ponds to maintain the seed to practice the MSMH method. Seeds are maintained in this ancillary pond at higher density with suboptimal feeding to restrict their growth (stunting) which serves as round the year seed source for multiple stocking after each harvest.

d. The multiple crop method is a kind of fish fattening where large fish of 300-400 gm are stocked at 2000-2500 per acre and grown for 4months so as to reach the market size . Similarly 3 crops of 4 month each can be taken in a year.

Pond Preparation

Lime Application

Weed fish removal

Weed removal

Fertilization

Learning Activity-3

Feed and Feeding

Learning Outcome:

Participants will gain knowledge about the feed material, feed quality, feed requirement and feeding practice to ensure better growth of fishes in their ponds.

Time: One hour

Steps

Supplementary feeding

1. If conventional feed mixture of groundnut oil cake (GNOC) and rice bran (1:1) is to be used the same may be provided in the pond at 4-3, 3-2 and 2-1.5% during 1-2, 3-4 and 5-6 months, respectively. The feeding rate should be maintained between 1.0-1.5% from sixth month onwards to put control on the FCR. Commercial sinking/ floating pelleted feeds are also available in the market, which is also being fed to fish with good result.
2. Feed dough are provided in customized feed bags (1.5-2 ft X 1ft) with 3+3 hole of 5 mm diameter on either side at the bottom for feed passage which are tied up in bamboo-poles.
3. The feed bags will be kept hanging in water column with the help of bamboo poles. Each of these bags can hold up to 6 to 8 kg feed .The number of bags/ feeding point should be increased with increase in daily feed requirement.
4. In case of using sinking pellets, these are spread from the dyke to few metres inside the pond. The feed are spread in a half-moon shape using a feeding bowl. With use of floating pellets, this can be provided preferably inside a frame made of PVC pipes floating on water surface. After 2.0-2.5 hour, the bags are checked for leftover feed. If the feed is left in the bag, the next meal is reduced accordingly and *vice versa*.
5. Lime is applied in every 15 days in the feeding area to facilitate mineralization of the feed waste and feces in the feeding area. The place of feeding may suitably be changed periodically.

Learning Activity-4

Fish Health Management

Learning Outcome:

After completion of this course module, the participants are expected to gain knowledge about the diseases associated with fish and their management economically. They also understand the challenges faced and their solutions.

Time: One hour

Steps

Fish health management

Fishes should be sampled once in every 15 days to check the health and growth of fish and the body surface should be checked for presence parasites if any.

The following table will give a preliminary understanding about different disease issues in grow out culture of

Common clinical signs & symptoms	Possible causes
Sudden death of fish without showing much symptoms of disease	Low oxygen level (DO) Exogenous toxins Poisoning Per-acute bacterial and viral disease
Gasping, coming to surface, crowding at inlets or corner of the pond	Low DO Gill parasites/Gill disease Bacterial gill disease
Jumping, flashing, rubbing	Ectoparasites, toxins, irritants in water
Excess production of mucus from skin/gills	Ectoparasites, toxins, irritants in water, myxobacterial infections
White cotton-wool growth on skin	Fungal infection (Saprolegenia), Cytophaga infection Columnaris disease
White spots on skin	Parasitic disease (*Icthhyopthirius*), Myxobolus infection
Swelling on skin	Parasitic cysts, tumours
Haemorrhages on scales, fins	Bacterial infections, Ectoparasites with secondary bacterial infections
Skin lesions/ ulcers	EUS, Ectoparasites with secondary bacterial infections, Systemic bacterial infection, Nutritional imbalances, Physical damages/Cannibalism
Fin rot	Bacterial disease, Cytophaga, Saprolegnia infection

3. In case of any infection/disease, experts may be consulted before undertaking any treatment.

Preventive methods to be adopted to prevent occurrence of disease:

- Regular monitoring of water quality parameters is utmost important to control diseases. The pH should be between 70-120 ppm in culture pond and total alkalinity should always be > 100ppm in culture ponds.
- Proper stocking density should be maintained (4000 fingerlings/acre pond water spread area)
- Application of bleaching powder / calcium oxide for pond disinfection is a good practice. Ponds with history of repeated occurrence of obligate parasite should be kept without fish for at least 7-10 days before stocking. This practice helps to eliminate the obligate parasites.
- Quarantine checks and prophylactic measures like bath treatment with antiseptic solutions should be done before releasing fish into the culture pond.
- Liming, fertilizer application should be done depending on the water quality parameters and as per the actual requirement of the particular water area.
- Frequent observation of the fish as far as possible through periodic netting is a good practice for taking timely corrective measures. Fish pathologist/ Expert advice should be immediately sought in case any abnormality is noticed either in pond environment or with the stocked fish.
- Dead or moribund fish should be immediately removed and suitably disposed-off or buried away from culture site to prevent spread of the disease.
- Since, response to a particular chemical or drug varies greatly depending on several factors like water quality, type, size and species of fish, temperature and dose level; hence, the same should always be

Learning Activity-5

Harvesting & Marketing

Learning Outcome:

At the end of the course module, participants will gain knowledge about the method of harvesting and marketing

Time: One hour

Steps

1. Generally, in carp grow out systems, fishes are harvested after a grow-out period of 10-12 month during which it reaches to average marketable size of 0.8 to 1.0 kg.
2. In multi-harvesting system, the fishes attending the market size are periodically harvested from the pond, releasing back the smaller ones for further growth.
3. Partial harvesting of larger size fishes can also be initiated after six months of culture, which will ensure continuous return, reduction of investments and risks and congenial environment for the remaining fishes to grow.
4. The price in the domestic market is influenced by the demand and supply. Fresh fish fetches about 1.5 fold higher market price than the iced ones. When sold in live condition, the carps command still higher sale value compared to that of iced ones.

ANNEXURES

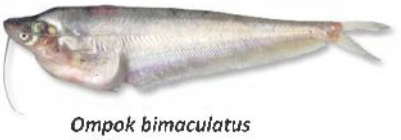
ICAR-CIFA Poster Series No.: 2

ICAR-CIFA's CONTRIBUTION IN SPECIES DIVERSIFICATION

HIGH VALUE SPECIES

Clarias batrachus
Magur
ମାଗୁର ମାଗୁର

Ompok pabda
Pabdah
ପାବଦା ପାବଦା



Ompok bimaculatus
Pabda
पाबदा पबुआ

Horabagrus brachysoma
Sun catfish
पीला टेंगरा ହଳଦିଆ କଣ୍ଟିଆ

Pangasius pangasius
Pangas
पेंगस ନଦୀ ଜଳଜ

Pangasianodon hypothalamus
Sutchi catfish
विदेशी पेंगस ଜଳଜ

Rita chrysea
Mahanadi rita
मुसेर (रिटा) ମୂସିଆଳି

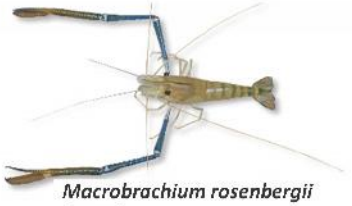
Mystus vittatus
Tengra
ଟେଂଗରା କଣ୍ଟିଆ

Channa striata
Stripped snakehead
सोल ଶୋଉଳ

Channa marulius
Giant snakehead
साल ଶାଳ

Anabas testudineus
Climbing Perch
कवई କଉ

Oreochromis niloticus
Nile Tilapia
तिलापिया ଜାପାନୀ କଉ



Macrobrachium rosenbergii
Scampi
ଝିଙ୍ଗା ଗୋଲଡା ଚଙ୍ଗୁଡ଼ି

Macrobrachium malcomsonii
River prawn
ଝିଙ୍ଗା ନଦୀ ଚିଙ୍ଗୁଡ଼ି

Lamellidens marginalis
Mussel
सीपी ଶାମୁକା

Compiled by: Dr. S.K.Swain, Dr. S.K. Sahoo, Dr. Rajesh Kumar, Dr. Shailesh Saurabh, Dr. Sivaraman I. and Dr. B.B. Pillai

ICAR-Central Institute of Freshwater Aquaculture

(ISO 9001:2015 Certified Institute)

Kausalyaganga, Bhubaneswar-751002

ICAR-CIFA Poster Series No.: 3

ICAR-CIFA's CONTRIBUTION IN SPECIES DIVERSIFICATION

CARPS & BARBS

Labeo rohita
Rohu (Jayanti)
ରୋହି ରୋହି

Catla catla
Catla
कतला ଭାକୁର

Cirrhinus mrigala
Mrigal
ମୃଗଲ ମିରିଢାଲି

Ctenopharyngodon idella
Grass carp
ଗ୍ରାସ କାର୍ପ ଦଲଝାଇ

Hypophthalmichthys molitrix
Silver carp
शिल्वर कार्प ରୂପାପେଟି

Cyprinous carpio
Common carp
କମନ କାର୍ପ ବିଲାତି ରୋହି

Labeo fimbriatus
Fringed lipped carp
ଖୁରସିଆ ପେଡୁସି

/Khursa
Labeo gonius
Kuri
लेबियो गोनियस ଖୁର୍ସିଆ

Labeo calbasu
Kalabinsi
କାଲବାସୁ କଳାବଂଶୀ

Labeo bata
Bata Pohala
ବାଟା ପୋହଳା

Cirrhinus reba
Reba Pohala
ରେବା ରାଢ଼ ପୋହଳା

Osteobrama belangiri
Manipur osteobrama
ପେଗୁଂବା ପେଙ୍ଗୁଆ

Hypselobarbus pulchellus
Pulchellus
ହରଗୀ ପଲ୍‌ଚେଲସ୍

Puntius/Systomus sarana
Munda Sarana / **Olive barb**
शिल्वर बार्ब ଶେରେଣ୍ଡା / ମୁଣ୍ଡା କରାଣ୍ଡି

Puntius/barbonymous gonionotus
Silver barb /**Java punti**
ପଲଚେଲସ ଚାଇନା କରାଣ୍ଡି

Compiled by: Dr. S.K.Swain, Sunil Ail, Dr. P.C. Das, Dr. P.P. Chakraborty, Dr. Sivaraman I. and Dr. B.R. Pillai

ICAR-Central Institute of Freshwater Aquaculture
(ISO 9001:2015 Certified Institute)
Kausalyaganga, Bhubaneswar-751002

Appendix-II to ATMA Cafeteria

	OPERATIONALIZING FARM SCHOOL AT BLOCK / GRAM PANCHAYAT LEVEL	COST NORMS/ CEILINGS
	At Farm School (Block /GP Level)	**Rupees**
1	Frontline demonstration at Farm School on a maximum area of 2.5 acre at same rates as approved under the Guidelines of National Food Security Mission for the crops mentioned therein. For other crops rates, rates may be decided by ATMA MC subject to a maximum of Rs. 4000 acres covering items mentioned in NFSM Guidelines.	7,500#
2	Grant towards logistics support to Farm School	1,000*
3	Contingency	2,000
4	IPM Kit to 25 Farm School trainees @ Rs. 200/- per kit.	5,000
5	Details of interactions / training at Farm School	
(a)	*Honorarium for maximum two external trainer for maximum 6 visit @ maximum of Rs.250 per visit per trainer*	3,000
(b)	*Travel expenses for maximum two external trainer for maximum 6 visits @ maximum of Rs.150 per trainer per visit*	1,800
(c)	*Food expenses for 28 participants @ Rs.30 per participant per day for 6 events.*	5,040
(d)	*Printed literature @ Rs.50 per participant for 28 participants and trainers*	1,400
	Total:	**26,740**
6	Maximum service charge to achiever farmer/Implementing agency running the Farm School, as per decision of GB, ATMA	2,674
7	Either Training or Exposure Visit of Achiever Farmer for about a week	**
	Grand Total:	**29,414**

\# Average tentative figure

* Lump-sum amount of up to Rs. 4000 (once for a set of Farm Schools) will be provided to the BTM so that capital assets are reused on a rotational basis as far as possible.

** Expenditure may be met from B2/B4 of cafeteria of activities.

ICAR-CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE

(An ISO 9001:2015 Certified Institute)

(Indian Council of Agricultural Research)

Kausalyaganga, Bhubaneswar-751 002, Odisha, India

Tel.: (0674) 2465421, Fax: (0674) 2465407

Email: director.cifa@icar.gov.in

www.cifa.nic.in

WhatsApp: +91 7790007797

Email:
ask.cifa@icar.gov.in

Follow us on facebook @
www.facebook.com/icarcifa

To know about our training programmes please visit **www.cifatraining.com**