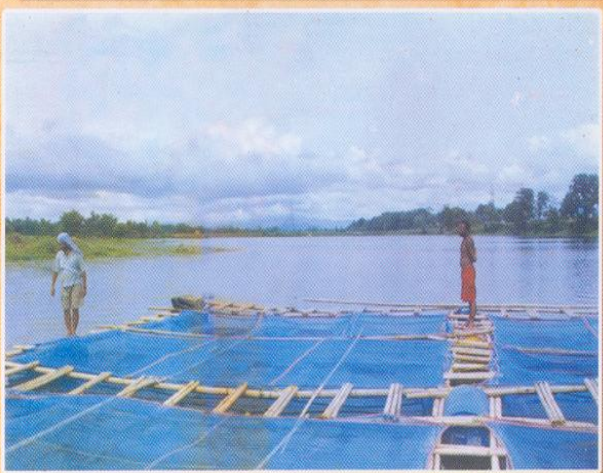


## GROW MORE FISH THROUGH CAGE CULTURE



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**CENTRAL INLAND FISHERIES RESEARCH INSTITUTE**

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### Introduction

In spite of having enormous potential of fish production from beel fisheries resources of Assam, the yield is pitiable. Several reasons are being attributed to this poor fish production. Insufficient auto-stocking due to failure of natural recruitment highlighted the necessity for stocking the beels with appropriate species, number and size of fish at right time. Stocking the beels with fish seed is the one and only means of meaningful conversion of accumulated organic matter of beel into highly valued fish flesh. To develop 'conveyer system of fish production' in beels, where harvesting continues year round, batch stocking of fish seed is required. This practice will ensure continuous utilization of fish food resources, thereby reducing the chance of wastage of natural food, which is sufficiently available in beels. To develop this system of fish production, availability of required size, number and species of fish seed would be a major concern for beel managers. Stocking of beel with tiny fry or fingerlings, which is teemed with piscivores, is a futile effort of enhancing fish production. To achieve the estimated potential of 1000-1500 kg/ha/yr, stocking of advanced fingerlings (10-15 cm) is required, which are costly and not easily available. In-situ rearing of fry to advanced fingerlings in secured captivity of nylon-net floating cages could prove to be an easy solution. Cage culture can be practiced round the year and also can be used to grow table-size fishes.

### Suitability of site for cage construction

- It is applicable to all water bodies including non-drainable, non-seinable and flood-prone areas, otherwise not suitable for aquaculture.
- The site should have (1) depth of at least 2 m at the cage site (2) good supply of oxygen (3) less winds and waves (4) easy accessibility from land, (5) less anthropogenic pressure, (6) little away from macrophyte-choked area to avoid high fluctuation in oxygen level.
- Even in macrophyte-choked water bodies, a selected area can be cleaned and utilized for cage culture.

### Construction of cage frame

- Empty PVC/metallic drums (200-250 litre), 13 m long bamboos, nuts and bolts are required to construct cage frame.
- Arrange 12 floats (empty PVC drums) longitudinally 3 m apart in 3 rows on a vacant field of ~150 sq m area near the bank of the water body.
- Now place 13 m long bamboo poles in parallel manner, 153 m apart over the drum and tie them temporarily with coir rope.
- Place another 3 pairs of same size bamboo with same gap of 153 transversely above the previously laid bamboos, keeping a distance of 6 m to make a square shaped frame.
- Drill bamboos, arrange them one upon another and join with nuts and bolts.
- Bamboos are placed above the float in such a manner that tightly holds the float in the gap.
- Then, make walkways with half-split bamboos tied with coir rope across the frame.





### Cage making

- For raising fry to fingerlings, good quality nylon net having 1 mm mesh size could be used.
- A convenient dimension of 6 m x 3 m x 1.5 m net cage can be prepared with the help of a tailor.



- Use nylon thread for stitching.
- All the joints are to be reinforced with nylon ribbon (1-1.53) made of fresh beads.
- Provide loops at regular interval of 3 m on upper and lower margins of cage for tying it with bamboo frame and sinkers.
- Provide a top cover to prevent predatory birds and reptiles and also escape of fish by jumping.

### Cage installation

- Once the bamboo frame is ready, gently drag it into water. Then tightly fasten floats with frame using iron wire.
- Make a rectangular bottom frame with split bamboo. Tie each cage's bottom side's loop with the bottom frame by nylon rope. Carry all the net-cages along with bottom frame on the main frame floated near shore.
- Drag the cage to the pre-determined site.
- Hang the cages one by one and tie with bamboo frame using parachute chord. This will help in easy lifting of the cage for monitoring.



- Tie half-bricks to each corner of bottom frame and release the cages slowly along with bottom frame in water.
- Anchor the cage with bamboo poles.
- The cage is now ready for fish stocking. But, stock after a week as periphyton growth on cage wall prevents bruising of young fish's tender skin by rough surface of the net.

### Stocking

- Estimated stocking density is 550 - 750 fry per cage of 18 cubic meter (6 m x 3 m x 1 m), @ 3-4 lakh/ha.
- Fishes including IMC (catla, mrigal, rohu), minor carps like reba, bata, gonius, calbasu in addition to grass carp, common carp and Java punti etc. can be stocked.
- Fry of 1 - 1.5 cm size can be stocked in fine mesh net-cage and reared up to advanced fingerling stage (10-15 cm).
- Morning is the best time for stocking as temperature is quite comfortable and chances of mortality will be less.

### Post-stocking management

- Supplementary feeding is compulsory in cage culture.
- The stocked fishes may be fed @ 4% of their total body weight. The ration level should be readjusted every 15 days on the basis of increased biomass, as the fish grows bigger.
- Mix locally available feed ingredients like rice polish (RP) and mustard oil cake (MOC) in equal quantities. Soak mustard oil cake in water for overnight, mix with rice polish and make balls. These balls are kept in submerged feeding trays hanged from two opposite corners of the cage.
- The conventional feed mixture of RP and MOC can be improved by fortifying with vitamin (2%) and mineral (2%) mixture for better growth performance. For better water stability the feed mixture is cooked with 5% wheat flour (muida) for a while to make dough. Now, make small balls, dry under sun and keep in sealed polythene bags until used.
- Food should be given in a tray. Feed twice a day, usually in the morning and afternoon at fixed times (Around 8.00 AM & 4.00 PM).



### Harvesting

- Within 2 months, the fishes will grow to advanced fingerlings size (10-15 cm) and ideal for stocking in beel.





- In case of table size fish production, harvest after rearing them for additional 2-3 months in modified cage with wall of bigger mesh size (1 cm) net to facilitate better waste removal. Nylon net of 1 mm mesh may be used at bottom.
- For harvesting, detach the bottom frame from the cage and start lifting the cage from three corners, thereby leading the fishes to a corner near the opening of the cage.
- Remove the fishes with scoop net, keep them in a plastic bucket, count and release in the beel.

### Production cycle

- Same cage can be used for several crops in a year.
- Fingerling production should start with the availability of fry during April.
- Three crops of advanced fingerlings, after every 2 months of rearing, can be obtained during April to October.
- A crop of table size fish can be obtained by rearing for 5 months from November to March.

### Economics

#### Basic facts

- The nylon cages shall last for 2 years and floats last for 5 years.
- Three crops of advanced fingerling and one crop of table size fish can be produced in a year.
- Unit prices for advanced fingerlings and table size fish are Rs. 2.50/- and Rs. 5.00/-, respectively.

#### Investment

- Capital investment for cage fabrication and installation is Rs. 15,000/-.
- Recurring expenditure for first crop is Rs. 1000/-, for subsequent crops is Rs. 1200/- and for table fish production is Rs. 2000/-.

#### Income

- From 1st crop :  $16000 - 2.50 \times 3750$  (75% survival) = 6625/-
- From 2nd and 3rd crop :  $(1200 \times 2) - (2.50 \times 3750 \times 2)$  = 16,350/-
- From table fish crop :  $2000 - 5 \times 3500$  (70% survival) = 15,500/-
- Net income from 1st year = Rs. 25,225/-
- Net income from 2nd year = Rs. 40,025/-
- Total net income from 2 years = Rs. 65,250/-

#### Do's and don'ts

- Do not feed newly stocked fish for first 2 days as they are stressed from transport.
- Reduce or stop feeding until fish respond actively to feed.
- Catch few fishes every 15 days to monitor their growth by weighing in a top-pan balance and subsequently adjust the ration.

- Place the broader side of the cage wall facing wind direction to facilitate better water exchange.
- In the event of reduction in water level, drag the cage frame to a place where at least 30-50 cm gap between cage bottom and beel bottom is available.
- Choking of cage wall due to bio-fouling caused by the growth of attached algae can prevent water exchange. To avoid this, 4-5 common carp can be stocked in each cage to graze on interior wall of the cage mesh.
- If choking problem persists, then exchange the cage sequentially every 2 weeks with a new cage for sun-drying the fouled cages and after drying, rub the cage wall with hands, then jerk vigorously to detach and remove the fouling material.
- The exterior of the cage may be scrapped with the help of a coir-made broom.
- Remove dead fish, if any, from the cage immediately.
- Repair any holes formed in cage wall immediately.

### Conclusion

The technique of fish culture in cages has immense scope in open waters of our country, particularly in the eastern and northeastern states of India having vast area of water cover in the form of ox-bow lakes, rivers and channels. Cage culture is very simple, cheap and above all assured means of fish production. It can prove to be a boon for the managers of open water resources who are interested in enhancing fish production by means of artificial stocking. Cage culture offers the opportunity of producing both stocking material and table fish. In a year, 2-3 crops of advanced fingerlings and one crop of table fish can be produced from the same cage, making the operation highly profitable. The greatest advantage of cage culture lies in its guaranteed return on investment. Mass adoption of cage culture in resources like natural lakes, ox-bow lakes, irrigation canals, channels and reservoirs would surely make blue revolution a reality in our country.

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