CARP SEED RAISING

NURSERY POND MANAGEMENT

The three-tier system of carp culture involves raising of fish in nursery, rearing and stock ponds. The first step begins with the raising of three to four days old hatchlings (5 to 6 mm) of cultivated carps to 25-30 mm for about 2 week in nursery ponds. At this stage yolk absorption is over and the hatchlings (spawn) start feeding independently. Spawn resulting from hypophysation are always preferable for stocking since the seed thus obtained is pure.

LOCATION AND SELECTION OF NURSERY PONDS

Nursery pond should be located a little away from the river bank so as to avoid major fluctuations of water level in ponds.

The ponds are usually small and shallow. Seasonal ponds are preferable to perennial ones, as seasonal exposure of the pond bed to direct sunlight helps in improving pond conditions. The main criteria for selecting the pond site should ensure adequate supply of water and the soil must be retentive. A desirable pond size in which spawn may be reared is about 20 m×20 m with 1.2 to 1.5 m water depth.

MANAGEMENT TECHNIQUES

Nursery pond management comprises following two stages:

Pre-stocking management pertaining to preparation of nursery ponds for introduction of spawn and Post stocking management involving supplementary feeding and harvesting.

Pre-stocking management:

Eradication of weeds: In nursery ponds, eradication of aquatic and marginal weeds can be done manually. Deweeding is essential since these weeds provide shelter
for predatory insects which lay their eggs on leaves and stems. Moreover, these weeds utilise nutrients from water and soil of the pond, thereby affecting the production of fish food organisms in the pond.

**Eradication of predatory fishes:**

Removal of predatory and weed fishes from nursery pond prior to stocking with carp spawn and fry is essential. In perennial ponds where dewatering is not possible this is usually done by the application of chemical fish poison or those of plant origin. Poisonous chemicals are however not favoured as it has got long ranging adverse effect on biota. Moreover toxicity of chemical fish poisons remains for longer duration in the treated pond than that of the fish toxicants of plant origin.

Oil cake of Mahua (*Bassia latifolia*) an effective plant piscicide is used @ 200 ppm (100 kg/0.04 ha) which kills the fishes within 4 to 6 hours. The added advantage of this plant poison is that it also acts as a fertilizer.

**Manuring**

Next step is to fertilise the pond heavily with organic manure like cowdung @ 10,000 to 15,000 kg/ha. However overdose may cause diseases like gill rot in fishes and possible oxygen deficit, specially in the early morning hours, often resulting in the mortality of stocked spawn.

In nursery pond, use of mineral fertilizers is not recommended as the application of these may give rise to persistent algal blooms. These are harmful for young tender fry.

However, the beneficial effect of organic manure can be further enhanced by application of commercial lime along with the manure or earlier at the rate of 300kg/ha.

The entire operation of manuring the pond with raw cowdung may be skipped where the pond is poisoned with mahua oil cake which acts as a manure too. This helps in reducing the expenditure on account of fertilization.

**Eradication of aquatic insects and other enemies:**

Majority of the harmful insects in nursery ponds are water bugs, beetles and naids of dragon flies, capable of attacking and killing fish larvae. They also compete
for food with young growing fish. Both larvae and adult insects can be equally destructive in some cases. Presence of frogs and snakes are also harmful to the young fishes directly or indirectly. Therefore, the insects, frogs and water snakes are to be removed completely from the nursery ponds prior to stocking of spawn by repeated netting. This operation is to be followed by the application of emulsion of soap and oil in nursery ponds which will effectively kill rest of the insect population by obstructing their respiration. The emulsion is prepared by mixing any cheap vegetable oil @ 56 kg/ha and cheap country made soap @ 18.6 kg/ha.

Stocking:

Considerable mortality of young hatchlings may occur due to rough handling and as such this should be done with due care. Nursery ponds are to be stocked with about 4 days old spawn which are expected to attain 25 mm size in 12 to 14 days time in the ponds so that it is profitable commercially.

Nursery ponds should be stocked either in the early hours of the morning or late in the afternoon. The rate of stocking may be 25-35 lakhs/ha.

Post-stocking Management:

Supplementary feeding:

The amount of natural fish food produced in the nursery pond is generally not adequate to meet the requirement of the growing carps. Hence it is necessary to supplement the natural food by artificial feed for better results. Fry are fed with a mixture of oil cake and rice bran/rice polish. Generally the mixture of finely powdered groundnut oil cake and rice polish (1:1 ratio by weight) has been found to be effective as artificial feed. The following schedule may be adopted.

1. 1st day to 5th day of stocking 5.6 kg/day for one million spawn (Four times the initial weight of the total spawn)
2. 6th day to 12th day of stocking 11.2 kg/day for one million spawn (Eight times the initial weight of the total spawn stocked)
3. 13th day after stocking — No feed
4. 14th day after stocking — Harvesting

The feed may be broadcast all over the pond once daily in morning hours. An efficient feed should contain 42-45% protein and 26-30% carbohydrate. For optimum growth and survival, cobalt chloride @ 0.01 mg/day/fish may be provided along with the food.
Harvesting:

In about 2 weeks time, the fry one expected to grow between 25-30 mm (about 1 inch) and can be harvested with a fine meshed (15 mm) drag net. If proper care is taken survival of fry ranging from 60 to 70% or even more can be expected.

Feeding is to be stopped a day before harvesting. Otherwise the fry with intestine gorged with food are susceptible to mortality during harvesting. For transport to long distance the fry should be conditioned by keeping them in hapas for about 3-6 hours. Harvesting should be done during cool morning hours. On cloudy morning, harvesting of fry may be delayed till there is sufficient day light.

In a season of three months, 3-4 crops can be raised from the same nursery pond. The fry may be released to the rearing ponds for further rearing or may be marketed to fish farmers for raising table-size fishes.

COST AND RETURNS

Scientific nursery pond management is highly remunerative. However, net profit is liable to variations under different conditions like (i) nursery area available with the fish farmer (ii) location of the nursery (iii) local demand for fry (iv) quality of the seed produced (v) facilities available with the fish farmers for disposal of fry (vi) source of fish seed and (vii) productivity of the nursery pond.

Gross out put, paid out cost and net farm income

Nursery pond management: Per ha in one crop (15 days)

A. Input

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Quantity (kg)</th>
<th>Rate (Rs.)</th>
<th>Expenditure (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Weed clearance</td>
<td>—</td>
<td>—</td>
<td>250.00</td>
</tr>
<tr>
<td>2.</td>
<td>Mahua oil cake</td>
<td>2500 kg</td>
<td>80/100 kg</td>
<td>2000.00</td>
</tr>
<tr>
<td>3.</td>
<td>Organic manure</td>
<td>6250 kg</td>
<td>20/1000 kg</td>
<td>125.00</td>
</tr>
<tr>
<td>4.</td>
<td>Lime</td>
<td>250 kg</td>
<td>1/kg</td>
<td>250.00</td>
</tr>
<tr>
<td>5.</td>
<td>Soap &amp; Oil</td>
<td>18 kg, 56 kg</td>
<td>5kg, 10/kg</td>
<td>90.00, 560.00</td>
</tr>
<tr>
<td>6.</td>
<td>M.O.C. &amp; R.B.</td>
<td>95 kg, 95 kg</td>
<td>2/kg, 0.5/kg</td>
<td>190.00, 48.00</td>
</tr>
<tr>
<td>7.</td>
<td>Spawn</td>
<td>30 lakhs</td>
<td>250/lakhs</td>
<td>7500.00</td>
</tr>
<tr>
<td>8.</td>
<td>Netting</td>
<td>30 man days</td>
<td>10/man day</td>
<td>300.00</td>
</tr>
</tbody>
</table>
9. Watch & ward & labour 100 man days — $1000.00
10. Depreciation, repairing etc. — — $1000.00
11. Rent of water body — — $1500.00
12. Interest on working capital — — $2221.00

Total Input Cost — $17034.00

Fry production at 60% survival rate — 18,00,000 nos.

B. Return

1. Sale of 18,00,000 fry @
   Rs. 40/1000
   Rs. 72000.00

C. Net profit (B—A)

   Percentage of return on variable cost 322.7
   Profit percentage to turnover 76.3

N.B.—2-3 crops are possible in one season from such pond.

MANAGEMENT OF CARP REARING PONDS

Successful fish culture to obtain high production depends upon stocking proper seed and getting high survival combined with good growth. The fry are transferred from nurseries to rearing ponds for further rearing to fingerling (100-150 mm) size before introduction into large stock ponds.

The need for raising fingerlings is mainly to avoid the loss due to predation in large stock ponds where they are raised to table size.

1 SELECTION OF PONDS

Rearing ponds may be 0.08 to 0.12 ha in size, rectangular in shape with water depth ranging from 1.5 to 2.0 m. Seasonal ponds or impoundments, which can retain sufficient water for 4-6 months are preferable to perennial ones. Though bigger ponds can also be utilized, smaller ones can be more efficiently managed.

2 POND PREPARATION

2.1 Weed clearance

Weeds take away the essential nutrients, shelter fish enemies and impede free movement of fry and also netting operations. These can be economically removed from small shallow ponds by manual labour.
2.2 Eradication of unwanted fishes

Eradication of predatory and weed fishes is an essential step in pond management. Perennial rearing ponds are to be drained and dried completely, if possible, during summer months. When this is not possible, the ponds have to be treated with suitable fish toxicants of plant origin.

Mahua oil cake is a popular fish toxicant and is effective at a dose of 200-250 ppm (i.e., 2,000 to 2,500 kg/ha meter). This also acts as a manure at a later stage. The required quantity can be first soaked in water till it softens and thereafter can be mixed with more water and broadcast uniformly throughout the pond. The ponds treated with mahua oil cake will be free from its poisonous effect in 20-25 days and fish food organisms develop thereafter.

The quantity of fish toxicant required to treat a pond is calculated on the basis of the total quantity of water in the pond. If the pond is rectangular or square in shape, the following method may be adopted to calculate the required quantity of mahua oil cake:

\[ \text{Length (m)} \times \text{breadth (m)} \times \text{depth (m)} \times \text{dose of toxicant} = \text{Total quantity of toxicant required in g when the material used is in solid form.} \]

When the material used is in liquid form, the quantity is in ml. When pond depth is calculated, a number of readings are necessary and average value is considered as depth. When the pond is circular in shape the formula to be followed is \( \pi r^2 \times h \times \text{dose of toxicants} \), where \( \pi \) is 3.14, \( r \) is the radius and \( h \) is the depth of water.

2.3 Pond fertilization

Liming the pond @ 200 kg/ha at the outset is a sound practice. Provision of adequate natural food to a great extent can be ensured in the pond through manuring and fertilization at fortnightly intervals. The pond may be manured with cowdung @ 5000 to 7500 kg/ha in 5 instalments. The initial application may be carried out a fortnight before the fry are introduced in the pond. However, if the ponds are treated with mahua oil cake, the quantity can be reduced to half. Inorganic fertilizers like urea @ 100 kg/ha or ammonium sulphate @ 200 kg/ha and single superphosphate @ 100 kg/ha and muriate of potash @ 20 kg/ha may be applied in 5 instalments alternating with organic manure (cattle dung) to keep up the production of plankton (fish food organisms).

2.4 Stocking of fry

Generally, the fry of 2-3 weeks old and 20 to 30 mm in size are stocked for rearing to fingerling size.
Different stocking densities varying from 1,00,000—3,00,000/ha can be tried with different species combinations.

Before stocking the pond, toxicity of the water should be tested by keeping a few fry in a hapa fixed in the pond at least for 24 hours. In case there is no mortality the fry can be stocked. The container in which fry are transported for stocking should be half submerged near the margin of the pond, so as to gradually equalise the temperature of water inside the container with that of the pond. After this, the fry may be gently released in the pond, allowing some water to get into the container. This operation should preferably be done during morning or late afternoon avoiding midday heat.

Stocking may be done at any of the following ratios:

**Indian major carps**

- Catla+rohu+mrigal

**Exotic carps**

- Silver carp+grass carp
  - or
  - Silver carp+grass carp+common carp
    - or
  - Silver carp+grass carp+common carp

**Indian major carps** + **Exotic carps**

- Catla+rohu+mrigal+Common carp
  - or
  - Catla+rohu+mrigal+grass carp
    - or
  - Catla+rohu+mrigal+grass carp
    - or
  - Silver carp+grass carp+common carp+rohu
      - or
  - Silver carp+grass carp+common carp+rohu

<table>
<thead>
<tr>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:4:4</td>
</tr>
<tr>
<td>1:1</td>
</tr>
<tr>
<td>4:3:3:3</td>
</tr>
<tr>
<td>5:1.25:3.75</td>
</tr>
<tr>
<td>3:4:1:2</td>
</tr>
<tr>
<td>4:3:1.5:1.5</td>
</tr>
<tr>
<td>3:3:3:1</td>
</tr>
<tr>
<td>3:1.5:2.5:3</td>
</tr>
<tr>
<td>4:2:2:2</td>
</tr>
</tbody>
</table>

### 2.5 Supplementary feeding

Production of plankton in the pond cannot be maintained at desired level even after regular manuring and fertilization in view of the heavy stocking density. In
order to meet the increasing demand, supplementary feed consisting of a mixture of groundnut/mustard oil cake and rice bran 1:1 ratio by weight in powder form is broadcast in the pond during morning hours. During the first month, the quantity of feed per day may be given at the rate of 12 kg/ha, which may be increased to 20 kg/ha during the second month and to 25 kg/ha in the third month when the stocking rate is 2,00,000—3,00,000 fry/ha. In case dark greenish colour develops in pond water, it would be better to suspend the feeding for some days till water condition becomes normal. When grass carp fry are stocked, duck weeds (small floating weeds like Wolffia, Lemma and Spirodela) may be introduced in required quantities and progressively increased depending on the demand, preferably within an enclosure so that duck weeds do not drift and cover the whole pond.

2.6 Duration of rearing

Duration of rearing can be decided, based upon the desired size of fingerlings for stocking etc. Normally, rearing for 3 months is sufficient with stocking densities up to 2.5 lakhs/ha to obtain advanced fingerlings.

3 SURVIVAL AND GROWTH

In properly prepared ponds, the survival is quite high except when predators get in and also when the pond conditions are not satisfactory. With a stocking density ranging from 1,00,000 to 2,50,000 survival of 70 to 90% can be obtained and during a rearing period of 3 months the fry grow to fingerlings of 100 mm and above which is a suitable size for releasing in stocking ponds.

4 HARVESTING

The fingerlings should, therefore, be harvested after 3 months of rearing. Supplementary feeding may be stopped a day before harvesting. Harvesting should be carried out during cool morning hours.

5 COST AND RETURNS IN REARING POND MANAGEMENT

The cost and returns in rearing pond management is calculated as below. The calculation is based on the price level at Calcutta in 1983 and will vary from place to place with time.
Gross output, paid out cost and net farm income (rearing pond management) - 1 ha

A. Input

<table>
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<td>1. Weed clearance</td>
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</tr>
<tr>
<td>2. Mahua oil cake</td>
<td>2500 kg.</td>
<td>80/100 kg.</td>
</tr>
<tr>
<td>3. Organic manure (Red)</td>
<td>7000 kg.</td>
<td>20/1000 kg.</td>
</tr>
<tr>
<td>4. Inorganic fertilizer (urea)</td>
<td>20 kg.</td>
<td>2.5/kg.</td>
</tr>
<tr>
<td>5. Fry</td>
<td>2.5 Lakhs</td>
<td>40/1000/kg.</td>
</tr>
<tr>
<td>6. Feed—MOC</td>
<td>2250 kg.</td>
<td>2/kg.</td>
</tr>
<tr>
<td>—RB</td>
<td>2250 kg.</td>
<td>0.5/kg.</td>
</tr>
<tr>
<td>7. Netting</td>
<td>150 man days</td>
<td>10/man day</td>
</tr>
<tr>
<td>8. Depreciation &amp; Mise</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9. Labour including Watch &amp; ward</td>
<td>360 man days</td>
<td>10/man day</td>
</tr>
<tr>
<td>10. Rent of the water body</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>11. Interest on working capital</td>
<td>—</td>
<td>15%/annum</td>
</tr>
</tbody>
</table>

Total Input cost - Rs. 29084.00

B. Returns

Sale of 2,00,000 nos. fingerlings @ Rs. 200/1000 - Rs. 40,000.00

C. Net Profit (B—A)

Percentage of return on variable cost - 37.5
Profit percentage to turnover - 27.3