Transportation of fish seeds

- Transport of seed from natural environment or hatcheries is considered to be a crucial step in aquaculture.
- Traditional methods of carrying the seeds in earthern pots called ‘’Hundies’’ but this result in high mortality.
- Seeds being active, this results in exhaustion of available O2 of media at a shorter time.
- They need to be anaesthetized to reduce the activity to transport them in good condition.

Important parameters to be considered before transportation

1. Oxygen requirements.

* The oxygen required by spawn in mg/gm body weight is 10 times greater than fry and fingerlings.

* The tolerance ratio is calculated by increasing the oxygen level and comparing it with the CO2 level.

2. Oxygen consumption rate.

* The rate is proportionate to its size or body weight.

* ie, if the length is different and weight is same the O2 consumption will also be the same.

3. Ammonia and rate of O2 consumption.

* Spawn can tolerate 2.5ppm dissolved free ammonia and 15ppm of dissolved ammonia as inorganic salts.

* Increase in ammonia will results in decrease of O2 and increase of CO2 in blood.

4. Temperature and O2 utilization.

*Metabolic activity is directly proportional with temperature.

Reasons of mortality

- Dissolve oxygen level in transporting water reduces and Carbon dioxide level increases.
- Due to metabolic activity of fishes the concentration of ammonia, urea and uric acid etc increase in the water, hence fish gets stress.
- If transportation is done in high density it may lead to mortality of fish due stress of oxygen.
- If transportation is done in improper vessels, physical damage of fishes may occur.
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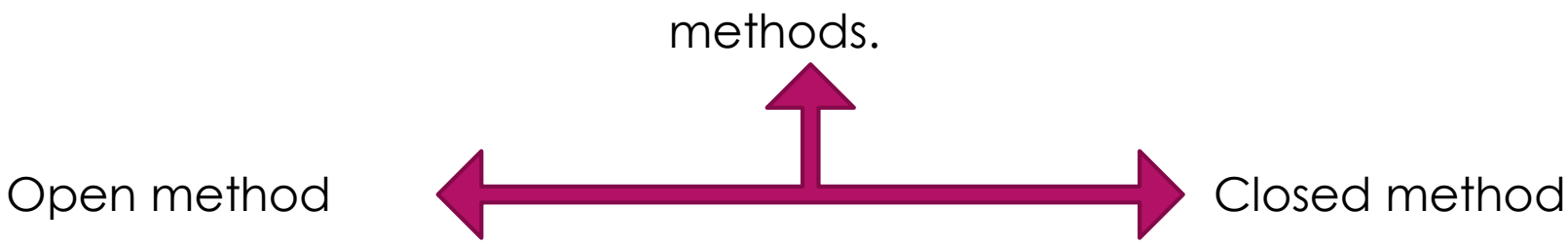
Methods of transporatation

- Mainly two methods:



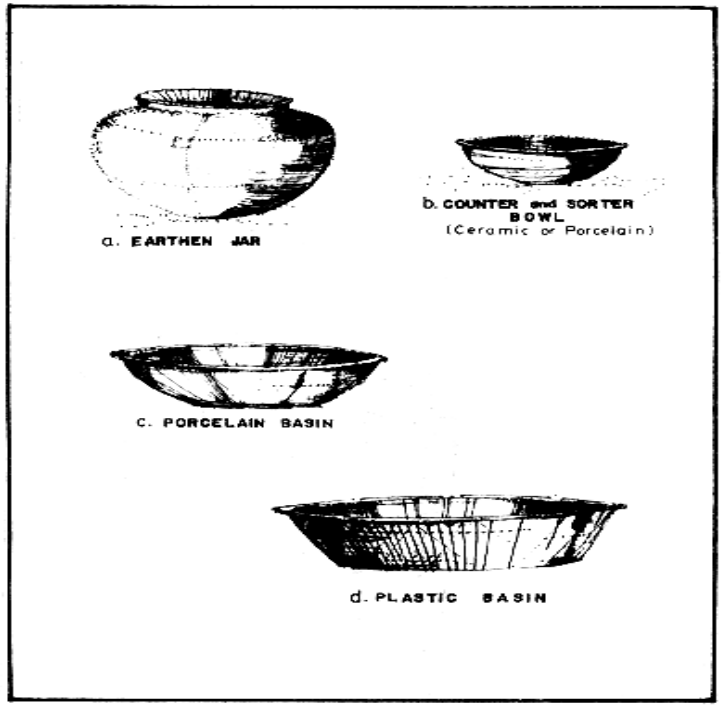
1. Open method
   a. earthern pots.
   b. aluminium pots protected externally by coir mesh.
2. Closed method

   Plastic bags, buckets, collapsible plastic pools and fibre glass tanks.

Open system

- The containers are carried on sling along small roads and paths to deliver.
- In open method water is continuously splashed or agitated for aeration. This makes the seeds more stressed and leads to mortality.
- Stressed seeds become more inactive and are subjected for predation or injuries.

Open Method

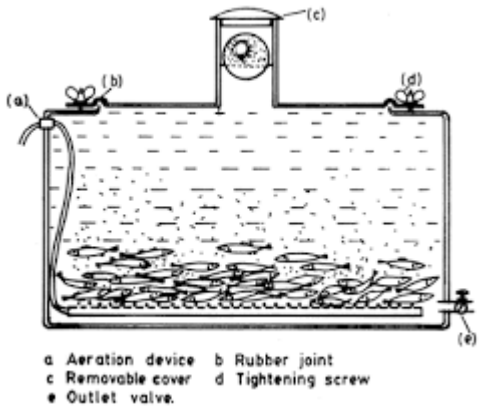

a. EARTHEN JAR
b. COUNTER and SORTER BOWL
(Ceramic or Porcelain)
c. PORCELAIN BASIN
d. PLASTIC BASIN


OPEN SYSTEM
Figure: Open System of Fish Transportation

Closed method

- In closed system fiber glass containers or plastic bags are commonly used.
- The seeds are conditioned before collecting and are oxygenated using cylinders.
- Containers are filled 2/3 oxygen and 1/3 water .
- Fishes are first conditioned by starving them and keeping them in a crowded condition.
- The plastic bags are kept in light tin containers or cardboard cartons and transported long distances by road, rail or air.

Closed Method



a Aeration device b Rubber joint
c Removable cover d Tightening screw
e Outlet valve.

CLOSE SYSTEM

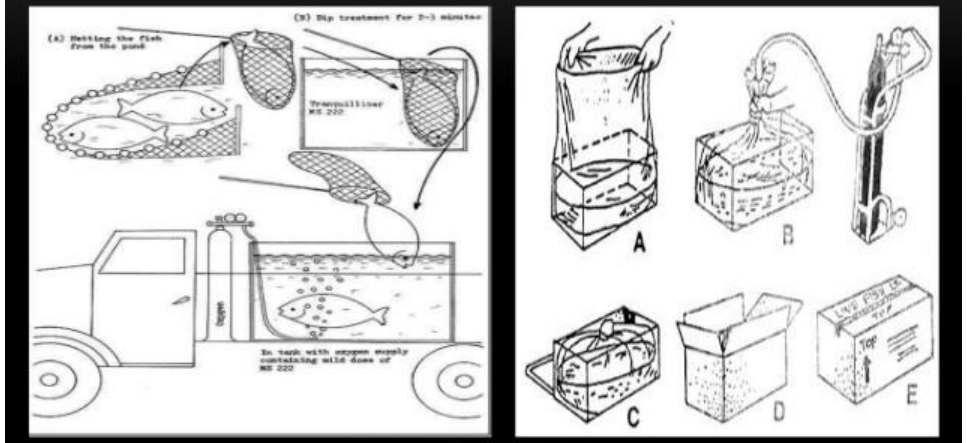


Figure: Close System of Fish Transportation

Seed collection and conditioning

- Conditioning actually means preparing the fish seeds to remain in a hardy condition.
- First, the seeds are collected by nylon / cotton cloth and dragged through water to remain in a smaller area to create a crowded condition.
- The fishes remains in this condition for a few hours to void their gut content.
- As size of fish increases the time of conditioning also increases.
- While keeping them in this, water is splashed into this small area to fasten the gut content elimination process.
    - **The fry - minimum of 3 hours.**
    - **Early fingerlings (35-50 mm) for 6 hours,**
    - **Advanced fingerlings (80-100 mm) for 9 hours**
    - **Juveniles (150 mm) for 12 hours.**

Preparation of packing the seeds

- First the seeds are bathed either in potassium permanganate (2-3ppm) or common salt (0.3%) for few hours.
- Process:

* Check the plastic bags for any leakage.

* keep them in clean tins provided with a lid to close it.

* Put pieces of used newspaper between the bags and the wall and the bottom.

* fill the bags with water taken from where the seed is taken.

* The seed are packed in plastic bag 1/3 full of water and 2/3 full oxygen tied with string and keep securely in tins.

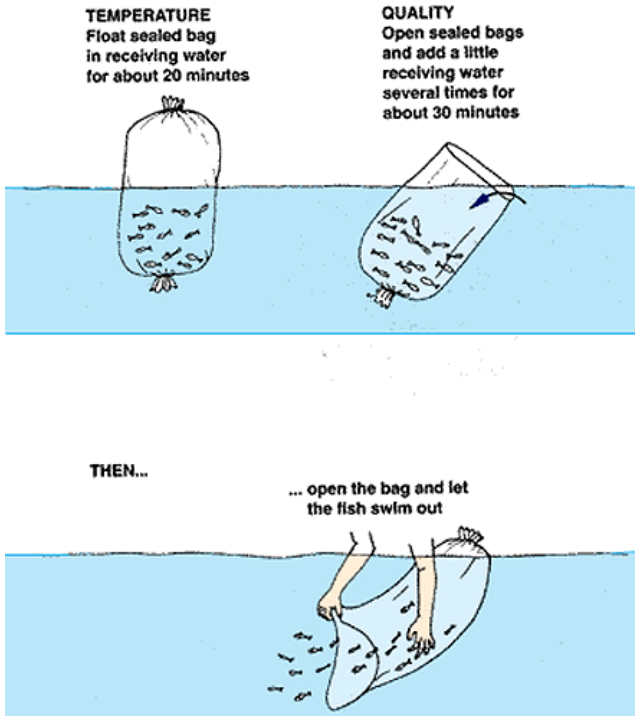
* the tins should be transported in shades.

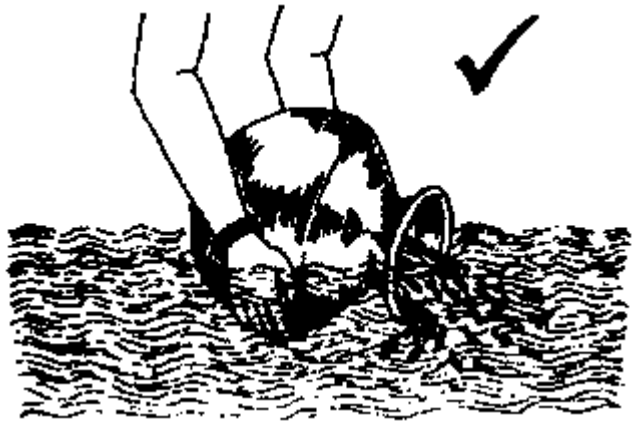
* transportation should be in morning or evening.

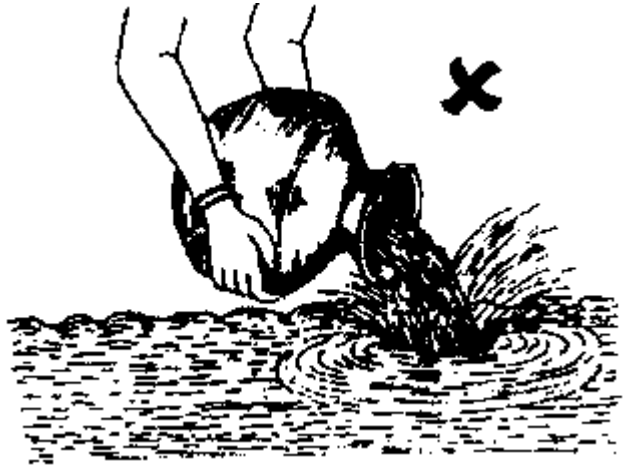

FISH SEED

Size of the seed (mm)	Numbers that could be packed (range)
Spawn (10)	35,000-50,000
Fry (20-25)	1,000-1,500
Fingerlings (35)	500-800
Fingerlings (45)	300-500
Fingerlings (55)	200-250
Fingerlings (65)	100-125
Fingerlings (75)	75-100
Fingerlings (85)	40-50

Releasing fish seeds







Anaesthetic

- In aquaculture, anaesthetics are used during transportation to prevent physical injury and reduce metabolism (DO consumption and excretion).
- An ideal anaesthetic should induce anaesthesia rapidly with minimum hyperactivity or stress.
- It should be easy to administer and recovery should be rapid.
- The anaesthetic should be effective at low doses and the toxic dose should greatly exceed the effective dose so that there is a wide margin of safety.

Characteristics needed for anesthetics

- Must be water soluble.
- Dosage required should be low.
- Time of induction and recovery should be short.
- Fish will tolerate well for several hours at low concentration.
- Should not have any side effects in the fish.
- Lethal concentration should be high, so that fish do not die accidently.

Anaesthetising the fish

- They are usually anesthetized by immersing them in an anaesthetic bath containing a suitable concentration of drug.
- The drug is absorbed through the gills and rapidly enters the blood stream.
- The simplest procedure is to prepare the required drug concentration in an aerated container and quickly but gently transfer the fish to the container.
- Main concerns involve maintaining proper temperature, adequate dissolved oxygen, low ammonia and a minimum amount of faecal matter

Anesthetizing and Transportation

- After conditioning fish seeds to be anesthetized to reduce the activity thereby reducing mortality.
- Anesthetics are chemicals used to reduce the metabolic activity of fish seeds by depressing the activity of brain.
- This will leads to reduce the O2 consumption.
- Concentration of usage depends on the size, shape and age of fishes.

Common anesthetics

- They are of two types:

Non Chemical anesthetics ⟷ Chemical anesthetics

- Hypothermia:

  * It is the oldest method.

  * The fishes are cooled to 40C AND returned to acclimation temperature.

  * This produce a thermal shock.

It is no so recommended.

  * Effective by using along with chemical anaesthetics.

- Electro anaesthesia

- Chemical anaesthetics:

  * **MS-222**- The chemical name for MS-222 is tricaine methanesulfonate.

  * **Benzocaine**

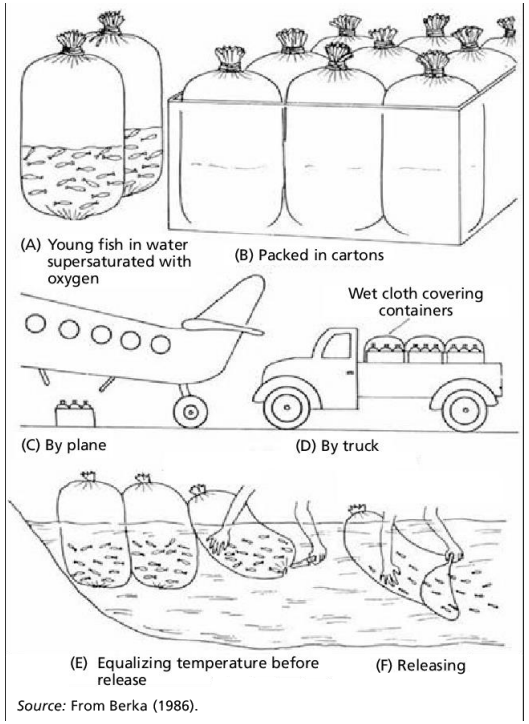
  * **Quinaldine**

  * **Metomidate**

  * **Clove oil**

  * **Aqui-S**

  * **Carbon dioxide**



Source: From Berka (1986).

Determination of quantity of fish

- Quantity of fish seeds for transportation depends on their size, mode duration of transportation, salinity of the medium and the ambient temperature.
- Formula to find the number of fish seeds:

$$N = \frac{(DO-2)\ X\ V}{C\ X\ h}$$

Where.

DO= dissolved oxygen in ambient water in mg/l

V= volume of water in litres.

C= rate of oxygen consumption by the individual fish (mg/hr).

h= duration of transportation (hr)