Unit 4:Fish Transportation

SEM IV ZOOA/ZOOG

Skill Enhancement Elective Courses (B)

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Transport of Seed Fish and Breeders

The mortality of seedfish (fry and fingerlings) which may be expected during transportation is mainly due to the depletion of dissolved oxygen and accumulation of gases like ammonia and carbon dioxide in the medium of seedfish carriers. These gases are lethal as they may reduce the oxygen carrying capacity of fish blood. For example, if the concentration of dissolved free ammonia exceeds 2 ppm, the seedfish especially that of carps may die. However, the lethal limits owing to carbon dioxide in fish depends on the level of dissolved oxygen. It has been reported that fry of more than 40 mm size may die at 15 ppm of carbon dioxide at a dissolved oxygen level of less than 1 ppm. On the other hand; such fry may die only at 200 ppm if the dissolved oxygen is around 2 ppm.

The traditional way of seedfish transport in earthen pots still exists in some parts of our country. This method, however, has several drawbacks such as (a) the earthen pots are likely to break in transit, (b) fingerlings may be injured owing to the shaking of pots, (c) possible only for short distances and short durations, and (d) frequent changes of medium (water) may result in mortality of seedfish owing to differences in water quality. Considering these, modern methods in which seedfish are transported in closed metal containers with oxygen packed medium, have now been propounded.

Techniques of transport

Traditional Method

In this method, earthen pots of about 15 litres capacity are used for the transportation of seedfish. The pot is first filled about two-thirds with water of the spawning ground. The optimum pH and dissolved oxygen of the water to ensure maximum survival rate of seedfish should be between 7.5 and 8.5, and 4-5 ppm respectively. After filling the pot with water, about 50,000 spawn are introduced. It is advisable to condition the spawn in the hapa for about three days without feeding prior to transportation. Otherwise, the excreta may pollute the water in the earthen pot leading to death of seedfish. Earthen pots are carried manually on bamboo slings. To avoid the mortality of seedfish due to asphyxiation, water is changed once in every five hours, depending however on the number of spawn in the pot and the duration of transport.

TRANSPORT IN CLOSED CONTAINERS

In this technique, seedfish (Fig. 61) are transported by road, rail or air in plastic bags filled with water and compressed air,

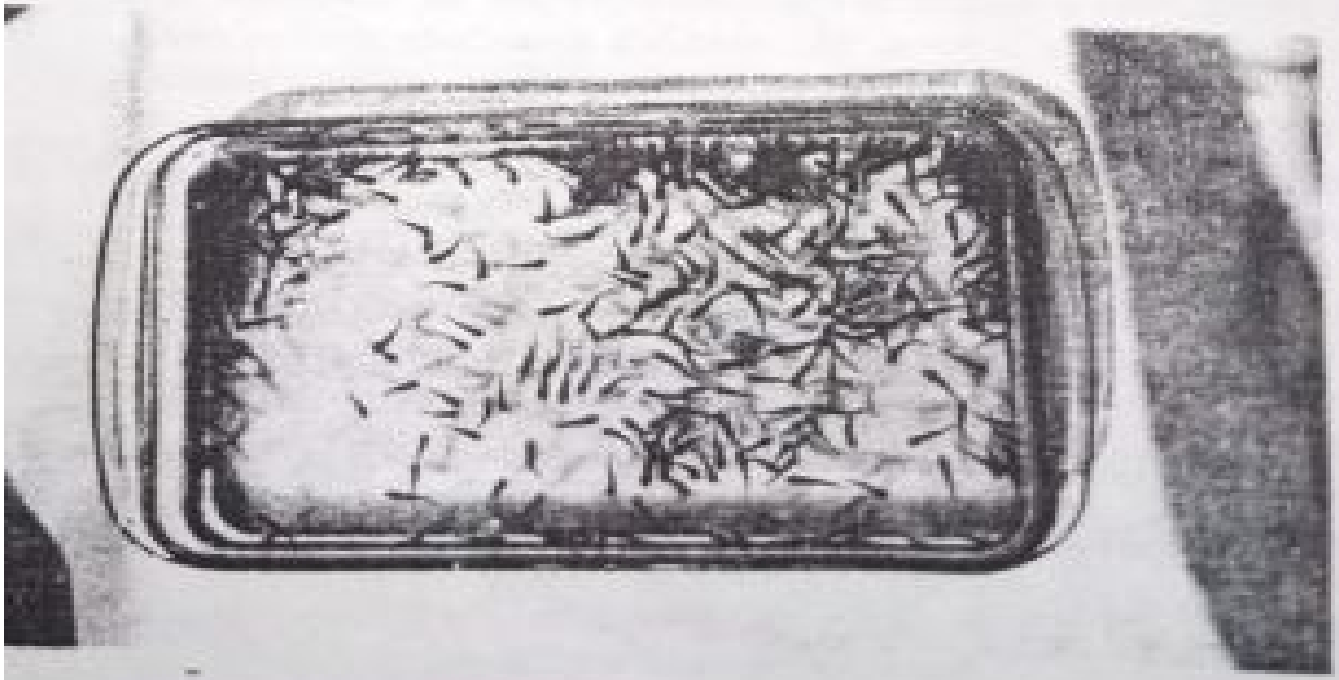

Fig. 61. Fish fingerlings

packed in metal containers. Metal containers made of aluminium, galvanised iron and tin are mainly used.

Tins of 40×25 cm (Fig. 62) could be conveniently employed. Polythene bags measuring 65×45 cm are checked first by

Fig. 62. Materials for oxygen packing of fingerlings; oxygen cylinder, tin containing polythene bag.

inflating the bag with little air and immersing them in a container with water. Leaking or damaged bag produces air bubbles in water. Every bag thus checked is then kept in a tin container and to about one-thirds of its capacity (8 litre) it is filled with aerated pond water. The fry or fingerlings, starved for one day and well acclimated are then carefully introduced in requisite numbers into the bag. A tube from the oxygen cylinder is then allowed into the bag and the portion of the bag about 10 cm from the top is twisted and a string is kept ready for tying. The oxygen is then drawn in from the cylinder through the tube until two-thirds of the bag are inflated or the top of the inflated

bag is slightly below the top of the tin. As soon as the inflated condition is obtained, the string is tied round (Figs. 63, 64) and the tin is closed. Such packed tins are kept in a cool place until they are transported to fish culture sites. To ensure better survival rate, the tins should be transported during evening or early morning. If the culture sites are distant, the tins in transit may be kept cooled by covering with water-soaked gunny bags.

Recent investigations made on the carp fry have shown that they could be anesthetised for transportation for ensuring better survival rate. The very purpose of anesthetising the seed-fish, which may lead to longer period of their survival is to minimise the concentration of toxic gases like ammonia and carbon dioxide in the medium by lowering the metabolic rate of the seedfish. Carbonic acid has been found to be the best anesthetic, because compared to other anesthetics such as Quinaldine and MS 222, it is not only cheap but also safe and easy to use. Seedfish have been found to survive for double the time of unanesthetised seedfish, besides ensuring better survival rate (90 per cent). The carbonic acid anesthetisation is to be done as follows. To about eight litres of water in polythene bags containing fry, 8 ml of 7 per cent sodium bicarbonate solution and 8 ml of 4 per cent sulphuric acid are added so as to produce a 500 ppm concentration of carbonic acid. Once carbonic acid is formed, the bag with anesthetised seedfish should be immediately filled with oxygen.

In order to eliminate the toxic ammonia from the medium and safeguard the seedfish from mortality, any of the following absorbants is added in the medium during transportation.

a) Synthetic amberlite resin

b) Pulverised earth

c) Permutit

d) Clinoptilolite (which when added in a concentration of 10-40 g/litre is found to reduce the ammonia to about 50 per cent during 24 hours transport).

It is also found that addition of sodium phosphate which acts as a buffer at a rate of 2 g/litre of the medium, may bring about a favourable pH of the medium for seedfish during transit.

Transportation of Trout Eggs

The fertilised eggs and 24 hours hardened eggs of cold-water

Fig. 63. Oxygen packing of fingerlings

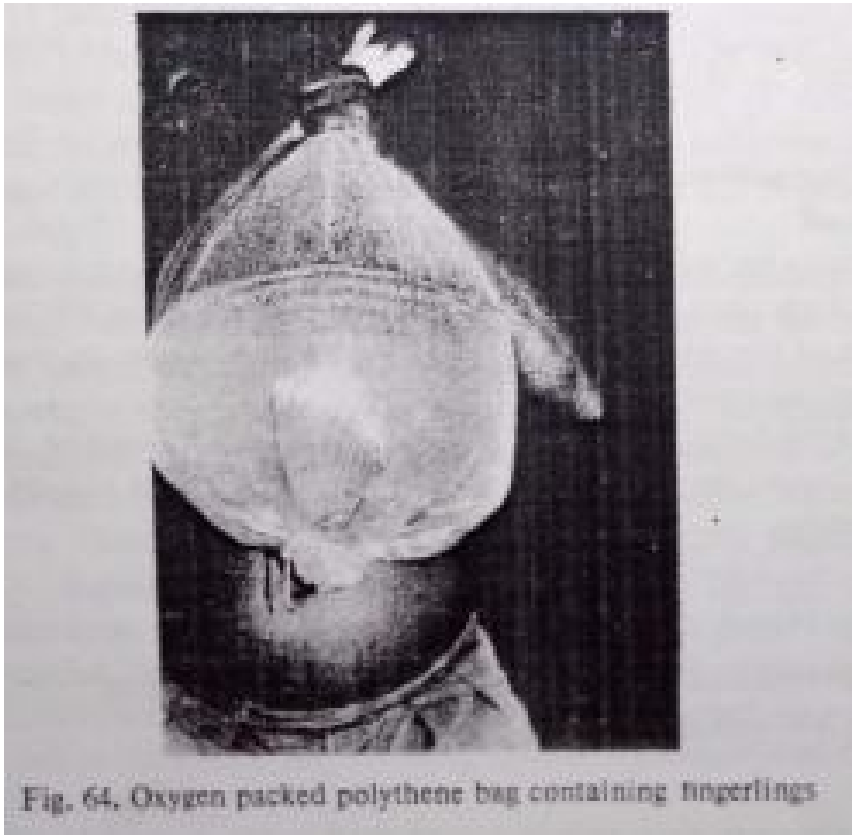

Fig. 64. Oxygen packed polythene bag containing fingerlings

fish, especially mahseer (*Tor* spp.) could be transported by packing them in moist cotton wool and placed in plastic bucket with an outer container. However, for transhipping trout eggs, cardboard cartons of 20 × 30 × 20 cm size with inner styrofoam lining are used (Fig. 65). Inside these boxes, porous polyethy-

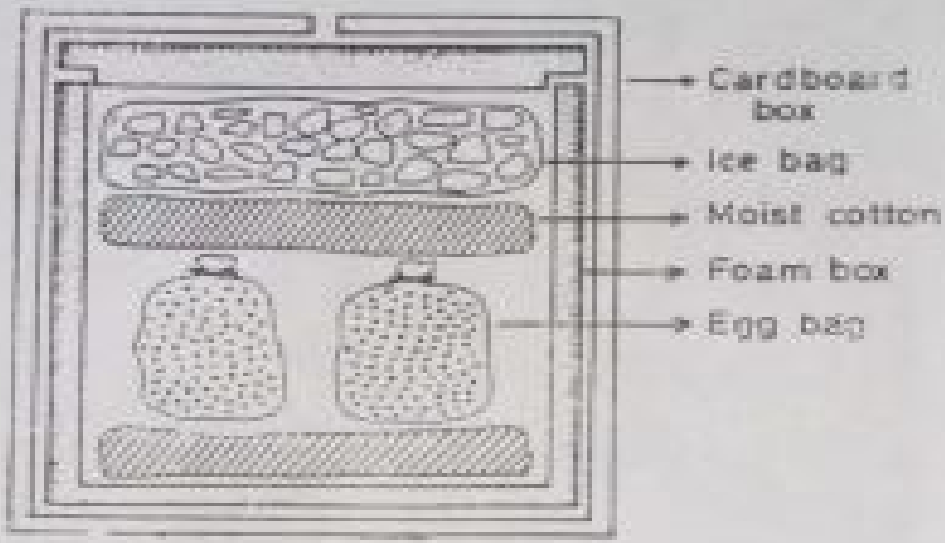

Fig. 65. Container for the transportation of trout eggs

lene bags containing about 4,000 eggs are sandwiched between an upper and lower moist sponge or cotton pad. Above the upper pad, a polyethylene bag containing about 1 kg broken ice is kept for maintaining low temperature.

Basis for estimating quantity of seedfish as a standard

The number of seedfish to be put in a closed and oxygen packed container for transport may vary according to the type and size of the seedfish, mode of transport, duration of transport and the environmental temperature.

A simple formula to find out the number of seedfish for transportation in containers with water but without oxygen is given below.

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

Where DO = dissolved oxygen in ambient water in ppm

V = volume of water in litre

C = rate of oxygen consumption by individual seedfish in mg/kg/hr

h = period of transportation in hours

For example, if the water volume is 30 litres and its ambient oxygen content is 8 ppm, weight of the individual seedfish, 1 mg, rate of oxygen consumption 200 mg/kg/hr, and the period of transport six hours, the number of seedfish for transportation will be

$$N = \frac{(8 - 2 \times 30)}{0.2 \times 6} = 150$$

The densities of seedcarp computed for transportation in eight litres of water under oxygen packing at two temperatures (the values have been derived based on the saturation of oxygen in water and oxygen consumption of fish) are given in Table 2.

Table 2: Number of seedfish packed at two different temperatures

Seedfish	25°C			30°C		
	Duration of Transport, hr					
	6	12	24	6	12	24
Spawn (<8 mm)	12,000	6,000	3,000	10,000	5,000	2,500
Fry (8-40 mm)	600	350	175	500	300	150
Fingerlings (40-80 mm)	175	100	50	150	80	4

Transport of breeders

Breeders have to be transported without shock and injury. This may be done using open canvas carriers (1 × 1.25 m) or in splashless, closed and foam-lined containers with compressed air. It is always better to give dip baths to the breeders in any of the antiseptics or antibiotics, such as methylene blue (2 ppm), acriflavine (10 ppm), copper sulphate (0.5 ppm), potassium permanganate (3 ppm), chloromycetin (8-10 ppm) or sodium chloride (3 per cent), so as to protect them against infectious bacteria, fungi, etc. Further, before transport, the breeders have to be tranquilised using any one of the following anesthetics.

a) Quinaldine (2-methyl quinoline) (0.01-0.05 per cent)
b) MS 222 (Tricaine methane sulphonate or *m*-aminobenzoate methane—sulphonate—0.1 ppm)
c) Sodium amytal (50-170 ppm)
d) Tertiary amyl alcohol (0.05 per cent)
e) Phenoxy ethanol (0.01-0.05 per cent)

Reference:

Chapter entitled “Transport of Seed Fish and Breeders” in the book, Manual of Fresh-Water Aquaculture by Santhanam, Sukumaran & Natarajan