

# Role of community in production and supply of larger, quality fingerlings

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## Introduction

Quality carp seed is a prerequisite for sustainable development of aquaculture, and uncertainty in the availability of stocking materials is one of the major constraints to rapid expansion and growth of the industry. Fish seed are generally classified into spawn (6-8 mm size), fry (20-25 mm size) and fingerlings (100-150 mm size), and may be sold as 'yearlings' once reaching 100-200 g weight.

An increasing quantity of carp seed is being produced in India every year. For instance, the total fry production in India was estimated to be 632 million in 1986-87, which increased to 18.5 billion in 2002-2003 and is presently about 20 billion. However, reliable data on the production of larger size fingerlings and/or yearlings are not available. To stock the estimated 2.5 million hectares of ponds and tanks and 2.0 million hectares of reservoirs in India at 7,000 fingerlings/hectare, some 31 billion larger sized fingerlings are needed. However, only 10-15% of carp seed is grown to fingerling stage and rest perish in the nursing systems due to various biological, physical and chemical constraints. The production and distribution of seed is complex and dynamic. Although some entrepreneurs produce and distribute fish seed to end users, often as a part of complex networks, supply often remains erratic, particularly in rural areas. By and large, the gap between demand and supply of quality, larger sized seed remains a daunting task in rural aquaculture development, in spite of concerted R & D efforts. One approach to mitigating this problem is to encourage village communities to produce larger size fingerlings locally, which will also support more neighbouring farmers to adopt fish culture.

## Why use larger fingerlings?

Larger fingerlings offer many advantages:

- Larger fingerlings have higher survival as they are less vulnerable to predation and disease and more tolerant of environmental fluctuations.
- Larger fingerlings require less time to reach marketable size and result in higher production.
- More suitable for multi cropping and cyclic carp culture to ensure food fish production the whole year round.
- Larger fingerlings have higher demand in the early season, as they make best use of seasonal grow out ponds.
- Stunted fingerlings grow extra fast and can be sold at a higher price.

## How to produce larger sized fingerlings?

Larger fingerlings can be produced by:

- Nurturing spawn in high density, followed by thinning of fry which are then raised to fingerlings and yearlings.
- Nursing spawn at low density, which makes fry grow faster; advanced fry also grow into fingerlings 1-2 months earlier than conventionally reared fry and fingerlings.
- Producing spawn through early breeding before onset of monsoon to maximise time available for growth.
- Rearing fry at higher densities for 10-12 months to get stunted fingerlings/yearlings.
- Supply of quality food (optimum density of ideal zooplankton and added vitamin B and B12) and low density helps to ensure healthy seed with fast growth and survival of fingerlings.

## Nursing fish seed in community ponds

Fish seed nursing in backyard/community ponds becomes easy when a group of farmers/fishers with a common interest work together, shouldering the responsibilities jointly. However, such self-help groups need to have one or two disciplined, co-operative, and influential, risk bearing and devoted team leaders. The leaders must be farmers by profession, social by temperament and have missionary zeal for serving their fellow rural farmers. The leader is also expected to be simple, easily approachable by poor farmers and adaptive enough so that rural farmers will accept him/her unreservedly. Dynamism and good communication skills as well as capacity to deal with the authorities are essential.

For example, in fish seed nursing in community or homestead ponds, the major technological package of practices include renovation of water bodies, de-silting, eradication of aquatic and terrestrial weeds, removal of weed fishes and predators, liming, manuring and fertiliser application, procurement and stocking of fish seed, feeding, monitoring of health and growth, guarding the crop, netting and harvesting, marketing and transporting seed, and supplementary use of pond embankments for growing fruits, vegetable crops and live stock maintenance. These activities require joint community work, making use of people of both sexes and all ages. The community, being an informal association, most of the formalities and paper work are also eliminated.

## Potential for community based fingerling rearing

Natural resources are the backbone for economic development of rural communities. Community based fish seed nursing can take place in large or small water bodies, including many under-utilised areas such as canals, roadside ditches from where clay and soil is removed for repairing bunds and roads, and borrow pits where earth has been excavated for construction of mud walls etc. However, most such alternative water bodies are invariably shaded by large marginal trees and covered with aquatic weeds or eutrophic, requiring significant start up work to make them suitable for seed production.

### Good local leader – essential for success

As far as possible, water bodies with competing community interests or those that are being utilised by other groups should be avoided to prevent conflicts. Instead, emphasis is laid on utilising derelict water bodies as stated above, which are usually free from competing interests. The identification of common interest groups and their organisation at the initial stage is often a difficult task for executing agencies. The availability of good local leadership is essential in uniting community interests and fostering a collaborative approach.

### Steps for community-based large fingerling production

Fish seed production includes egg to spawn production for around three days, spawn to fry nursing for 15-20 days, fry to fingerling rearing for 60-90 days and fingerling to yearling rearing for 7-8 months. In coastal India, in some perennial ponds fry, fingerlings and yearlings are reared in succession during June-July, August-November and December-June respectively. Alternatively, community ponds may be stocked with carp fry and rearing of fingerlings and yearlings are continued in succession. For rearing of larger sized carp fingerlings, ponds of 0.05-0.1 ha with an average depth of 1.0-2.0 m are preferred.

Trees and bushes that provide shading and deposit excessive organic matter by leaf fall in the ponds are cleared before launching the fish seed nursing operation. Pond embankments are renovated with the provision of secured inlets and outlets. Since backyard ponds are shallow and small, aquatic weed clearance is usually performed manually. Predatory animals/fishes and weed fishes are eradicated by de-watering and drying the ponds or application of suitable piscicides.

Raw cattle dung is generally applied at around 3 tonnes/ha as basal manure in ponds. To enhance the fertilization effect liming is done at 200-250 kg/ha. For sustained production of natural fish food organisms a mixture of de-oiled cake, cattle dung/bio-gas slurry and single super phosphate in the ratio of 25:250:1 or 3-5 kg of multiplex pre-mineral mixture and vitamins in combination with RCD and de-oiled cake at 1,000 and 200kg/ha respectively are used in liquid forms four to five times before stocking spawn. Application of a mixture of 100 kg RCD, 50 kg poultry manure and 25 kg mustard oilcake/ha weekly once after seed stocking can ensure the abundant production of zooplankton. Addition of vitamin B and B12 gives better growth and survival of healthy seeds.

Where the ponds are used for fry rearing, the fry may be harvested by repeated netting on day 15-20 of rearing. At times, two crops of fry may be taken. After fry harvesting, the ponds are fertilised with the mixture of above manure to produce adequate natural food organisms. Two or three days after the pond has been fertilised, fresh fry are stocked along with the residual fry in such a way to maintain fry density at around 300,000-500,000/ha. Later a mixture of the above fertilisers is applied in liquid form at weekly or fortnightly intervals. Fingerlings are also fed traditionally and harvested by repeated netting after three months of rearing.

Fertiliser is again added to the ponds after harvesting the crop of fingerlings. Culture of yearlings is carried out by stocking appropriate carp fingerlings along with residual stock of fingerlings at 30,000-50,000/ha. During culture period ponds are fertilised once per month. Fingerlings are fed intermittently with kitchen wastes and with a mixture of ground nut oil cake and rice bran in the ratio of 1:1 by weight at 3-5% of the body weight. Complete harvesting of fingerlings is performed by de-watering the ponds in May to June.

To supply larger fingerlings earlier in the season, stunted fingerlings are grown. These are raised by stocking fingerlings at 250,000/ha in July-August. Stunted fingerlings grow up to 12-15 g in 10-12 months with 50-70% survival. They are grown with reduced nutrient uptake. When stunted fingerlings are placed on a high quality diet, they grow rapidly leading to efficient body weight gain. Hence stunted fingerlings/yearling are the most preferred stocking material by grow out farmers and fetch a higher price than the normal fingerlings. Hence fisher community sells off as much as they can to satisfy current year demand and then go for producing stunted fingerlings. Fish fingerlings are sold at the pond site to neighbouring village fish farmers or supplied through fish seed vendors of the region. However, large scale production of fingerlings is often distributed to distant locations in oxygenated packing.

In conclusion, the production of larger, quality seed through community-based approaches offers the following advantages:

- Provides a more secure supply of quality fish seed available to highly dispersed, small scale producers, therefore contributing to the growth of rural aquaculture.
- Generates income, livelihood opportunities and funds for further investment for the village community, drawing on locally available resources.
- May often be undertaken as a supplementary livelihood opportunity, enabling people to increase their income without disturbing their normal routine.
- Makes more efficient use of under utilised water resources of the village, while also improving their environmental conditions.
- Improves the organisation of farmer groups with common interests, empowering them and improving their socio-economic status.
- Improves access to extension and support services for fish seed nursing, through mutual sharing of experience and participatory approaches.