



Carp Polyculture Management to Boost Fish Production

Mukesh PB* and Brahmane MP

ICAR-National Institute of Abiotic Stress Management, India

*Corresponding author: Dr. Mukesh P Bhendarkar, ICAR-National Institute of Abiotic Stress Management, Malegaon, Baramati 413 115, Pune Maharashtra, India, Email: mk.bhendarkar@icar.gov.in

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Abstract

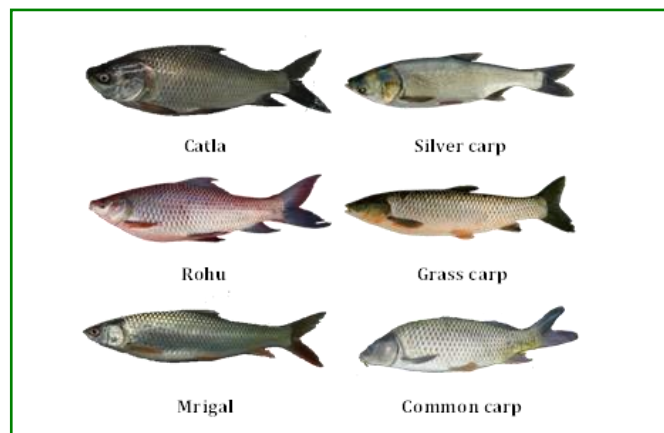
The century long history of carp culture is well known and the most important group of cultured fish in India are Indian Major Carp and Chinese Major Carp which belong to Cyprinidae family. Carps form the mainstay of culture practices in the country, supported by a strong traditional knowledge base and scientific input in various aspects of biology, environment, nutrition, and health management. The easy availability of seed and acceptance of wide range of feed are the main reason that carp still enjoys considerable demand in the any market place all over India. The three Indian Major Carp (IMC) species, Catla, Rohu and Mrigal together contribute a lion's share and Exotic carps form the next important group to the IMC segment. About 85% of this aquaculture is contributed by carp polyculture.

Keywords: Indian Major Carp; Chinese Major Carp; Cyprinidae family; Nutrition

Candidate Species

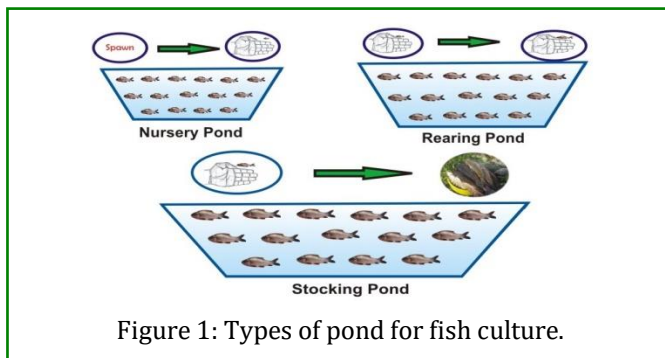
The three species of IMC being cultured *Catla catla* (Catla), *Labeo rohita* (Rohu) and *Cirrhinus mrigala* (Mrigal). In addition to these, three species of Chinese carp i.e.; *Hypophthalmichthys molitrix* (Silver carp), *Ctenopharyngodon idella* (Grass carp) and *Cyprinus carpio*

(Common carp) are used in polyculture. The principle of these modern farming practices is to employ compatible selected fast growing species of different feeding habit in different ratio for utilization of pond productivity at different ecological niche [1].



Culture Practices

Carp culture in ponds is basically a three-tier culture system i.e. nursery system, rearing system and production system; where the first step begins with the rearing of spawn (6 mm) up to fry stage (20-25 mm) for one month in nursery ponds. Water of the nursery pond must be filtered through a dense sieve of mesh size 1 mm. After one month nursing period fry must be harvested and transferred to rearing pond for 3-4 months. Production system is those that are in action when fingerling is reared to the table size fish. The harvested fingerling is stocked in stocking pond up to table size fish (see fig. 1). It can be practiced on different levels of intensity such as extensive, semi-intensive and intensive. To ensure high rate of survival and growth during all the three stages of rearing, a package of management practices should be strictly followed, ad slackness at any stage of the management procedure may affect farm productivity and profitability adversely [2].



Management Practices

The carp culture based on the intrinsic natural productivity of pond gradually developed with basic of scientific aquaculture management techniques that has ultimately boost the production of fish. The fundamental of pond management are:

- a) Pre-Stocking Management.
- b) Stocking Management.



- c) Post-Stocking Management.

Pond

The freshwater fish culture may be rain-fed or may be supplied with different water sources such as canals, springs, reservoirs, dug wells etc. If pond bottom has sandy or gravely soil, it should be sealed by clay layer to hold water. It can also be sealed by placing a water proof polyethylene sheet on the pond bottom and then covering it with soil. The construction of three ponds as suggested above enables efficient fertilization, feeding and harvesting (see figure 1). It also helps to eradicate the unwanted fish species, aquatic insect, parasites and maintains the physico-chemical characteristics of the bottom soil [3].

Pond drying

In the course of harvesting ponds, water is drained. It is a general rule that ponds should remain as dry as possible until the next production season (see figure 2).



Cleaning and cultivation of pond bottom

Removing objects, vegetation and aquatic weeds is the second step of pond preparation. Passing of dry pond bottom with a ploughing will ensure healthier life of benthos (see figure 3).

Eradication of unwanted fish and disinfection of pond bottom

The predatory or invasive fishes directly prey upon the juveniles (young ones of the fish) and compete with culture species for food, space and oxygen. Hence, before stocking of desirable species utmost care shall be taken for complete eradication of undesirable species which shall be done by repeated netting of pond or using fish toxicant (Mahua Oil Cake).

Liming

Quick lime at the rate of 200 kg/ha is recommended for accelerating the mineralization of organic matter and act as prophylactic measure. It acts as a buffer against pH changes and it increases the availability of carbon for photosynthesis (see fig.4) [4].



Figure 4: Liming of fish pond.

Inundation of pond

Pond filling should be done at recommended intervals of time otherwise water condition becomes favourable for aquatic plants that will grow with the rising water. Appropriate screening of water during inundation of ponds is the only prevention against the entering of unwanted fish and other organisms.

Manuring and fertilization

Next step after flooding a pond is manuring and fertilization, which plays a vital role in the productivity of the pond where fish prefers natural food is expected. Fertilization rate varies with water quality, temperature, pond nutrient component in the pond ecosystem. Organic manure in the form of cattle dung @ 1000 kg/ha is generally applied in 4 equal installments and inorganic fertilizers like Urea @ 25 kg/ha/month and single super phosphate 20 kg/ha/month may also be applied. Manuring and fertilization should be done at monthly intervals (see figure 5) [5].



Figure 5: Manuring and fertilization.

Proportion of fish species

Traditional carp culture was widely changed to polyculture after Chinese major carps were introduced. Proportion of carp and other fish species in polyculture as presented in table (see fig 6).

Three species combination		Six species combination	
Catla	40%	Catla	15%
Rohu	30%	Silver carp	15%
Mrigal	30%	Rohu	20%
Four species combination		Grass carp	15%
Catla	30%	Mrigal	15%
Rohu	30%	Common carp	20%
Grass carp	20%		
Mrigal	20%		

Table 1: Species combination in Polyculture system.

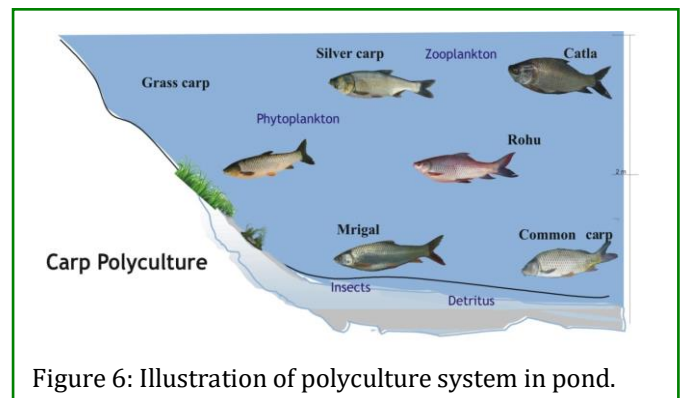


Figure 6: Illustration of polyculture system in pond.

Quantity of stocked fish

The stocking rate depends on the area of pond and stage of fish (see fig 1 and table 2).

Execution of stocking

The task of stocking is simple. Fish should pass with the least stresses possible. Therefore, fish of all stages must be handled with care and released gently by means of acclimatization (see figure 7). Time invested in this action will achieve better survival of stocked fish.



Figure 7: Acclimatization of fish seed.

Supplementary feeding

Supplementary feed in the form of ground nut oil cake and rice bran mixture should be provided in the pond at 4-3, 3-2 and 2-1% during 1-2, 3-4, 5-6 and 6 months respectively. Nowadays, sinking/floating pelleted feed are commercially available in the market which are also being fed to fish for good result.

Fish health management

Fishes should be sampled once in every 15 days to check the health and growth. The body surface should be checked for presence parasites if any.

Harvesting

Capturing fish with net is one of the most enjoying and critical operation. The periodical harvesting is done subsequently with dragnet of suitable mesh size and final harvesting is carried out by completely draining the pond (see figure 8).



Figure 8: Harvesting management in fish pond.

Particulars	Nursery pond	Rearing pond	Stocking pond
Area (ha)	0.02 to 0.05	0.04 to 0.1	0.5 to 2.0
Depth (m)	1.0	1.0 to 1.5	1.5 to 2.5
Stocking stage of fish	Spawn (6 mm)	Fry (20-25 mm)	Fingerling (80-100 mm)
Stocking density per Hector	5 to 10 million Spawn	2 to 3 lakh Fry	8 to 10 thousands Fingerling
Stocking period	1 month	3 to 4 month	8 to 10 month
Production	10 to 15 lakh fry	1.2 to 1.8 lakh fingerling	3 to 5 thousand Kg
Selling price	₹ 20,000 / lakh	₹ 60,000 / lakh	₹ 80-100 / Kg

Table 2: Details of carp culture practice.

Keeping in the view the local climatic condition with shorter growing period, the better management practices are introduced in carp polyculture system. The local availability of carp seed strengthen the private fish farming and adopting these management practices, farmers could get production of 3-5 tonnes every year.

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