

Adding Diversity to Pond Fish Production through Simple Cage Aquaculture

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Aquaculture is a highly diverse food production system. The diversity of aquaculture production is reflected in terms of holding units (ponds, cages, pens, raceways), management levels (semi-intensive, intensive, super-intensive), nature of rearing (mono-or poly-culture) and so on . Use of simple tools and implements proved to be successful and stood the test of time in the improvement of fish yield through aquaculture while sustaining the natural resources. Increasing preferential demand for fish which are likely to be in order of 16 million tonne by 2025 of which at least 12 million tonne would need to come from inland sector and aquaculture is expected to provide 10 million tonne has necessitated need- based modification and improvement of the existing seasonal and perennial aquaculture production systems to rear multiple species adapted to the environment and strong in resilience to infections.

In addition to the improvement in the conventional carp based farming, quite a few diversified systems have been developed including aquaculture in cages. Cage culture as it is commonly known is a system where fishes are reared within an enclosure (enclosed on all sides with mesh / net / natural or synthetic solid material) that may enable maintaining free exchange of water along with natural food organisms present with the surrounding water body. Cages are generally small ranging from 1 square meter (m²) and more. Stocking with appropriate fish species using the fish of desired length/ weight and introduced at the correct time are essential to optimize the fish yield. Cage culture is suitable to a wide range of freshwater ecosystems to take benefit of the natural productivity of the water body. This is not only compatible and non competitive with other on-going fish production systems but also rather complementary to some. Raising fish in cages is an alternative means of fish production especially for predatory and carnivorous fishes. The technology of cage culture is very simple and easily adoptable; harvesting of fish is convenient and though on a small



scale, an year-round supply of fish is possible for the farmer to get without any risk due to sudden flood or such natural calamity. The practice of cage culture thus has definite advantages with respect to ecological, social and economic benefit over and above the conventional systems.

The initiation of cage culture is made with a start of construction/fabrication of cages. An inexpensive simple floating unit of bamboo cage can be fabricated and installed even in a small pond, for example, with the support of bamboo poles affixed on the four corners of it. Following initiation several other steps are also carried out simultaneously like floating unit of a bamboo framework using HDPP barrels when a cage complex consisting of several floating units are to be installed. Selection of stocking material, stocking rate, supplementary hand-feeding with formulated feeds, cage and stock maintenance aspects and above all a record of cost of total input used is to be maintained. Generally four types of cages are used in cage aquaculture. Fixed, floating, submersible are submerged for normal freshwater ponds; a fixed type of cage is the most widely used system when the water depth varies from four feet to twelve feet. Fixed cages are inexpensive and simple. Floating cages on the other hand are supported by a floating frame in such a way that it does not touch the bottom. Floating cages are used when the depth is between 10-15 feet. Several kinds of designs and shape of floating cages can be there.

The selection of site for cage culture is often quite important for the success of fish production from the system. Water quality with respect to biotic and abiotic characteristics should be at par with the recommended levels, devoid of algal blooms, free from unnecessary aquatic macrophytes and should be placed in such a way that it is secured and disturbance-free. Bamboo cages are very common and generally available local variety from the market are utilised for cage fabrication. For large cages, HDPP drums with tightened lids may form suitable floats. As sinkers are locally available stones weighing 3-4kg are tethered to the bamboo frame with nylon ropes. Instead of industrially manufactured, framing of the cage can be made from locally available bamboo rather than steel or PVC material. Catwalks made of locally available bamboo cross beamed with timber are wired to the top of the bamboo frame for easy access.

Several fish species can be grown in cages including high-value carnivores -magur(*Clarias batrachus*), Singhi (*Heteropneustes fossilis*) , Murrels like *Channa panctatus*, Koi

(*Anabas testudineus*) and the like. Even the pengba (*Osteobrama belageri*) fingerlings can be grown well and bata (*Labeo bata*) can also be included if advanced fingerlings are locally available at the time of stocking.

The fish fingerlings may be raised in one's pond or may be bought from some accredited nursery /reputed fish farm . Only the fingerlings bigger enough to be contained inside the cages are introduced. Others may be kept in special enclosures till they grow big enough to be introduced in the cage. It seems in the cage rearing system of fishes, adequate natural food organism are not continuously ensured and exogenous feeding becomes crucial aspect in fish rearing in cages. Regular feeding following a rigid schedule both in quality and quantity of feed needs to be carried out at regular intervals of the day and in tune with the biological rhythm ;feeding should be taken into consideration of the nature of the fish reared like whether they are carnivores or herbivores or omnivores. In case of herbivores, oilseed meals along with rice polishing both finely ground, mixed and pelletized in the form of chowmein may be provided. But when fish has a carnivorous feed preference - an animal protein source like meat meal, prawn meal, marine trash fish meal, mussel meat meal , ant eggs, silk worm pupae need to be incorporated (any one of these) in the mixture prepared for pelletization. Generally in the cage system a single species is introduced. Feeds can be provided on a small bamboo flat pan or tray to avoid the loss of feed. One should ensure that overcrowding of fish in cages should be avoided to facilitate normal development and growth.

Harvesting is done from cages at the end of the culture period spanning generally over 6-8 months using a hand net. Compared to any other rearing method, cage culture operations and harvesting of fish from cages are not problematic at all. A record of number of fishes harvested and total weight of harvested fishes need to be recorded along with average initial weight /length.

Those farmers who do not have their own pond can think of cage aquaculture in someone else's pond also on payment of rent. Rearing of fish in cages requires careful vigil and follow-up of simple management practices. A prior hands-on training in applied aquaculture will always be helpful. Depending on the local availability, the type of fish to be incorporated can be decided but a cage is never suitable for composite fish farming or a polyculture of fishes. Catfishes are ideal even monosex tilapia can also be reared in bigger



cages. A pond where already carp polyculture is going on ,a production of catfishes like magur ,singi ,pabda,tangra can easily be produced in cages installed in the same carp polyculture pond.

Simultaneously species diversification and production system diversification can be carried out without incurring much additional expenditure. Such a mission can add diversity to the income, guarantee efficiency of resource use based on primary renewable resources. Cage culture ,therefore, provides an instrumental role in supporting the farmer/marginalised youth for additional income .Sustainability may be assured and any rural fallow pond can be brought under such fish production system through cage culture towards supporting the social and economic programme of the government in transforming the rural youth into an economically independent relevant workforce thereby strengthening the local economy in term of effectiveness and efficiency .this will be both economically and ecologically.



Demonstration of cage culture of carps with pelleted feeds at Saguna beel conducted by RRC of CIFA, Rahara under 'Outreach Activity on Fish Feed'





Bamboo slicings used for making cages and installed in rural ponds for small fish including cat fish rearing.

