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Indian Fisheries-Seed Production and Rural Employment

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Introduction:

Fisheries is an important sector in India, providing employment to millions of people and contributes to the food security of the country. Presently, India ranks second in aquaculture and third in fisheries production, contributing 1.09% to the National GDP and 6.72% to the Agriculture GDP and currently contributing 6.3% to the global fish production .Fisheries and aquaculture is one of the fastest-growing industries in the World and has been playing an important role in the economic development front on account of its contribution to food and nutritional security, national income, employment opportunities as well as generating livelihood option, especially for backward rural areas.

Commercially Important Finfish Resources

Fish Species Cultured in India, carp culture forms the backbone to freshwater aquaculture mainly dominated by Indian major carps, namely catla (Catla catla), rohu (Labeo rohita), and mrigal (Cirrhinus mrigala) which contribute a majority of the total Indian aquaculture production. With the introduction of carp polyculture system in the 1970s, three exotic carps, namely, silver carp (Hypophthalmichthys molitrix), grass carp (Ctenopharyngodon idellus) and common carp (Cyprinus carpio) now form the second important group. Even though the country also possesses several other minor carp species which show high regional demand, including, Labeo calbasu, L. fimbriatus, L. gonius, L. bata, L. ariza, Puntius sarana, Hypselobarbus pulchellus, H. kolus and Amblypharyngodon mola, as well as several others, commercial farming of these species has yet to take off. Among the catfishes, magur (Clarias batrachus) and singhi (Heteropneustes fossilis) are of prime importance. In recent years, tremendous progress has been made in the culture of fishes like Pangasius pangasius, Pangasius sutchi, Oreochromis niloticus, Ompok pabda, etc. The other finfish species of importance include climbing perch (Anabas testudineus), murrels (Channa striata and C. marulius), etc.

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Commercially Important Shellfish Resources

Giant river prawn (Macrobrachium rosenbergii), is the most important freshwater species followed by the monsoon river prawn, M. malcolmsonii. Giant tiger prawn (Penaeus monodon) and whiteleg shrimp (Litopenaeus vannamei) from the brackish water aquaculture sector,The total fish production of India during 2017-18 is estimated to be 12.60 million metric tonnes now it is improved to 17.545 MMT in 2023-24.


Fish is the chief source of protein for human nutrition and also a foreign exchange earner,standing 4th place in exports in the fisheries sector has an essential role in the socio-economic development of the country especially as a source of livelihood for a large section of the economically backward population of the country.

Seed Production:

Production of good quality fish seeds is an important asset for increasing fish production in any country. India has been able to stand second in fish production next to China because of the successful implementation of 'Induced fish breeding,' which supplies quality fish seeds to the farmers for culture across the country. India has established over 1,500 hatcheries in the country, producing over 32 billion carp fry.

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Fish Consumption, being an excellent source of protein and many other essential fatty acids and micronutrients, plays a particular role in human nutrition by providing a valuable and nutritious contribution to a diversified and healthy diet. With the ongoing changes in dietary trends, which continue to increase towards a greater variety in food choice along with improved health, nutrition, and diet concerns. The overall demand of fish for consumption is expected to be increased, with more and more people shifting their food habits towards protein rich diets. In India, 56% of the Indian population are fish eaters, and the per capita availability of fish is 6.35 Kg.

Fisheries related government schemes

Ongoing Government Schemes for Fisheries Development, The Government of India has launched central and state sponsored schemes for the development of fisheries in the state. The "Blue Revolution" or the "Neel Kranti Mission" was launched in the year 2016 by the Hon'ble Prime Minister of India with a vision to achieve economic prosperity of the country and the fishers and fish farmers as well as contribute towards food and nutritional security through full potential utilization of water resources for fisheries development in a sustainable manner, keeping in view the bio-security and environmental concerns.

- It focuses mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine.
- The key goal of the scheme would be to increase the share of Indian fisheries in the export sector significantly.
- It will ensure doubling the income of the fishers and fish farmers with inclusive participation of the socio-economically weaker sections and ensure sustainability with environment and bio-security.

The scheme was restructured by the Ministry of Agriculture and Farmers Welfare, Department of Animal Husbandry, Dairying & Fisheries by merging all the ongoing central assisted schemes under an umbrella of Blue Revolution. The restructured scheme provides focused development and management of fisheries, covering inland fisheries, aquaculture, and marine fisheries, including deep sea fishing, mariculture, and all activities undertaken by the National Fisheries Development Board (NFDB).

The availability of quality seed is prerequisite for rapid expansion and growth of aquaculture. Whereas fish seed production includes various stages from fertilization of egg to

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fingerlings and a need a duration of almost 385 days for production of spawn to yearling egg to spawn production for 3 days, spawn to fry nursing for 15-20 days, fry to fingerling rearing for 60-90 days and fingerling to yearling rearing for 8-9 months. Thus, the carp seed may be categorised at its final size into spawn

(6-8 mm size), fry (20-25 mm size), fingerlings (100-150 mm size) and yearlings (100-200 g weight).

What is rural carp seed production?

Carp seed production by small-scale households or communities using mainly extensive and semi-intensive management appropriate to existing resource base for their own use and/ or improving their family income" or "carp seed production using technologies adapted to locally available and limited resources of households" can be called as rural carp seed production.

- It is not very capital intensive or input intensive and contributes to rural livelihoods.
- It is different from more commercially carp seed production systems or entrepreneurial carp seed production.
- Evolving rural to entrepreneurial carp seed producers.

Spawn production in rural area:

Has certain disadvantages like:

- Difficult to estimate eggs.
- egg predation by pond animals.
- poor egg fertilisation.
- Release of carp spawns in incubation pool.

- **Hapa breeding** Common spawn production in rural areas generally carp spawn are generally produced twice during June-August and January-March of the year, following the adaptive breeding methods.
- **Pond breeding**: Common carp brood fish are reared in composite fish culture ponds. In season, clean aquatic weeds such as Hydrilla / Najaj or water hyacinth should be placed in

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pond's corners or inside floating bamboo frames in the evening hours. During late night to early morning fish breed naturally and eggs get attached to aquatic weeds/aquatic plants. Since water hyacinth is floating, the eggs get attached on the roots only. The egg loaded aquatic weeds should be collected in early morning hours and kept for incubation in hatching hapas or directly spread in well prepared nursery ponds. However, in nursery spread eggs the spawn survival is very poor than hapa hatching.

This method:

Brood fish are reared either in separate ponds or in composite fish culture ponds. Brood fish are netted out to segregate mature males and females. They are weighed and kept in breeding hapa containing suitable egg collectors in evening hours. Generally, 3-4 kg Hydrilla/ kg female fish is used as egg collector. Males and females are kept in ratio of 1:1 by weight. They breed naturally in hapa after 6-8 hrs. In less suitable condition fishes are injected with inducing hormones to ensure breeding. After spawning, the females are weighed to estimate the egg release. About 12-15 per cent of the weight difference goes towards faecal matter of fish and rest weight difference is due to egg release in ovary. One gram weight difference in ovary provides an estimate of 700 egg release. Egg attached 2-4 kg Hydrilla is spread per inner hatching hapa. Depending on water temperature, hatching takes place in 2 days and inner hatching hapas are removed in 3 days. After 4-5 days, spawn is collected for stocking in nursery ponds.

Hatchery breeding:

Some of the village hatchery owners use breeding pools for common carp spawning. They use nylon threads or plastic threads or plastic nets or Hydrilla or water hyacinth as egg collectors. Egg incubation is carried out in hatching pools.

Indian and exotic major carp spawn production Hapa breeding:

In remote villages brood fish are grown in composite fish culture ponds. During monsoon season they are netted out and fully mature males and females should be selected. Breeding hapas are fixed in composite fish culture ponds having common carps. Presence of common carp, prawns and crabs cause severe damage to carp eggs in breeding hapas. Hence, to avoid hazards of loss of viable eggs, the breeding hapas are fixed inside the net enclosure.

Generally, for one female two males are used. Intra-muscular or intra-peritorial injection is administered to brood fish during June-October. Females are injected with PG

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extract or glycerine extract of PG twice but males are injected only once. First dose should be given in the evening hours to female @ 5-6mg/kg and second dose after 4-6 hours of first injection @ 8-16 mg/kg. Males should be injected at the time of second dose of female @ 4-5mg/kg male. Presently synthetic hormones (ovaprim or ovatide) are used as inducing agents in rural areas. Both the males and females are injected only once. These synthetic hormones are administered @ 0.2-0.5 ml/ kg female and 0.1-0.2 ml/kg male. After 4-6 hours of injection fish spawn.

Fertilised eggs can be identified and quantified at comma stage of embryos and hatching are done using hapa hatching device. Spawn should be collected after 72-80 hours of hatching by filtering with inner hatching hapa with the spawn recovery of only 24-44 per cent of the fertilised eggs. The low recovery of spawn from hapa hatching device could be due to a combination of factors such as cutting of hapas by crabs and/or large freshwater prawns, entry of unwanted fishes in hatching hapas, presence of predatory cyclopoid copepods in hatching

hapas and sudden change in water temperature, depletion of DO content, water bloom and cyclonic weather.

Hatchery breeding:

For hatchery breeding, brood stocks should be maintained in separate ponds by stoking 1-3t/ha brood fish under scientific management. And injected with inducing hormones as mentioned in hapa breeding. In rural areas the spawning is done in breeding hapa or spawning pool but hatching is done in incubation pools. Two-three-year-old carps weighing 2-5 kg are the best for hypophysation.

Eco-hatcher

Which contains overhead tank, spawning pools, egg collection chamber, incubation pools and spawn collection chamber which can be generally used by the village entrepreneurs. An overhead tank is generally Have water holding capacity of 5000 litre can supply water to

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spawning and incubation pools. Depending upon the requirements, the sizes of spawning pools vary. Spawning pool is 8-9 m diameter and 1.0-1.5 m deep with the provision of water circulatory system and shower.

Farmers use 20-30 kg female per spawning pool and produce 250-400 litres of carp eggs in one operation. These eggs are incubated in 3-5 hatching pools. Incubation pools are 3-4m inside diameter and 1 m deep. Generally, 1 egg is incubated in one ml water. During egg incubation, farmers maintain water flow @ 2.5 lit/sec. initially, @ 2.0 lit/sec at twisting movements of embryos and @ 3.5lit/sec after hatching to get better spawn recovery. Farmers harvest 800,000 to 1,000,000 spawn/pool/operation. From hatchery breeding farmers get 80-95 per cent recovery from the viable eggs. By adopting circular carp hatchery some of the rural fish farmers changed into entrepreneurial seed producers

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