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Ecocarp Hatchery for Mass Seed Production of *Cyprinus Carpio*

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Abstract: ***It is seen through application of induced breeding technology of common carp seed production survivability of seed will definitely increase common carp seed production using weeds an egg collector and eco hatchery. From this study it is concluded that total spawn yield is five lacs that gives satisfactory result. Common carp breeding is not only help withstanding adverse seasonal condition but also in increasing fish seed production and providing employment to rural youth enhancing fish production and utilization of particularly small water bodies.***

Keywords: Induced breeding, Common Carp, Seed Production and Employment

1. Introduction

The fisheries sector has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries and is a source of cheap and nutritious food(Jingran,1991) Common carp is a Exotic fish and there are three varieties. *Cyprinus Carpio Var Communies*-Scale Carp (Tropical Water), Cyprinus Carpio Var Specularis- Mirror Carp (Temperate Water) & Cyprinus Carpio Var Nudus- Leather Carp (Temperate Water). Common Carp is omnivorous in nature and feeds bottom debris, sand and mud, nick of the aquatic weeds like *Hydrilla* and *Vallisneria.lt* is also a good fish for seasonal ponds because it grows fast. Common Carp grows almost as fast as cattla. (Ayyapan 2006) Besides, common carp has an inviting appearance and a delectable taste, which imparts a remarkable market acceptance.(Rath and Sarkar,2004)

Considering the aforesaid facts, a research work has been designed to work on production of common carp in hatchery system
Systematic Position:
Phyhum – Chordata
Subphylum – Vertebrate
Superclass – Gnathostomata
Class – Telostomi
Sub class – Actinopterygii
Order – Cypriniformes
Family – Cyprinidae
Genus – *Cyprinus*
Species – *carpio*
Type – *Cyprinus carpio*

2. Objective

- To reveal the competition status of exotic species, *cyprinus carpio* in compare to Indian major carp.
- To access the survival values and production capacity of the said species.
- To access the pure species collection with safe and sound condition.
- To access the quality of seeds and spawns.
- To provide employment facility to rural youth.

The inland fishery resources of India comprising rivers and canals (0.2 million KM), lakes and reservoirs (3.1 million ha.) and tanks and ponds (2.2 million ha.) offer enormous scope for augmenting fish production through capture and culture fishery practices.

3. Review of Literature

Of all the species of fish utilized by man the common carp *(Cyprinus carpio)* has the longest history of culture. As early as 475 B.G spawning of captive carp in china was described and advocated as a profitable has the longest history if culture .As early as 475 B.G spawning of captive carp in china was described and advocated as a profitable business by Fan Li the first known treatise on aquaculture.

The Asia has many similar native cyprinids which are used in aquaculture, but common carp are introduced between 1914 and 1957 and are cultured throughout the region.]

BROOD FISH POND

3.1 Types of Pools

Breeding Pond

As the water temperature exceeds 20^0C, preparation of breeding pond is carried out. The breeding pond is left dry before the breeding season. During this lime the repair of the pond's dyke, inlet and outlet are undertaken. About 10 Kgs. lime is broadcasted throughout the pond.

At the same time a thin stripes of bamboo are prepared and good quantity of terrestrial grass or fibre of Coconut or synthetic fibre are collected. The thin stripes of bamboo are interwoven in such a way that a 4' x 6' sized mat is made. The mattress of green grasses or fibre is called kakaboon. A

number of such kakaboons are prepared and stored under shade until the breeding season starts. With the rise of water temperature, the breeding pond is filled up with fresh water after screening at morning time. A number of kakaboons are fixed horizontally on the vertical bamboo pegs around the shore of the breeding pond. Generally, the kakaboons are fixed at or around 3' 6" - 4" high from the bottom of breeding pond and 4" -6" below the surface of the water. After filling the water, the breeding pond is left for whole day, so that the sill settles down and the water remains clear and warmer too.

After netting the female and male brood of common carp are kept in hapa separately in this pond for breeding purpose.

Spawning Pool

The tank having depth of 1.2 meter. The tank may be made of brick or RCC or FRP. The base of the pool is sloped towards centre where the central outlet is located. From the central outlet spawned eggs are carried to the egg collection chamber. In recent years the single water inlet point at 60° to the tangent at the junction of the wall and floor of the spawning pool is preferred. The spawning pool may also be connected directly to the incubation pool. In this case, individual egg delivery pipe from individual central outlet increases the egg recovery rate.

Water temperature in the range of 28°-30°C gives better breeding response.
Good quality of water with 5-6 ppm dissolved oxygen can hold 3-5 kg brood/m^3
Water depth in the spawning pool is maintained at 0.6-1.0m according to density of the brood in pool.
Brood fishes are kept under shower before and after hormone administration.
Spawning and hatching units are cleaned and disinfected 5ppm potassium permanganate solution before and after each operation. Again after 5-6 continuous operations, it is preferred to disinfect with strong formaldehyde solution.

Incubation Pool

The hatching pool or incubation pool is circular in shape and made up of cement concrete, brick masonry or FRP material. There are two chambers i.e inner and outer. The depth of the pool is 1.0-1.5m. The circular wall that separates the outer and inner chambers is made of wire mesh. Direction of the duck mouth and speed of water is maintained in such a way it keeps developing eggs away from both screen and water preventing them from mechanical injury.

The hatching time is temperature-dependent and varies from 16-20 hr.

The eggs are extremely sensitive to the harmful effects of various microorganisms. Such situation is generally come across during premonsoon breeding. To control this problem it is preferred to sprinkle potassium permanganate solution at 2hr intervals in the incubation pool.

For better recovery and survival of spawn, it is necessary to clean the chamber in *situ.*

SPAWNING POOL

INCUBATION POOL

Over Head or Storage Tank

This discertation had been started during 2017-2018 from December to April. The over head tank is used for supply of sufficient water for spawning, incubation and storage tanks. The floor of the tank should be 2.6m above ground level. The inside dimension should be 5.5x2.7x2.2 m and it should have 30,000 liters capacity. Small water storage tank of capacity 2,000 lit is required to operate the hatchery unit. The breeding pool and hatching pool are connected to the water storage tank separately or together in the same water line. Pump is used for filling water in the tank from an open well or deep tube-well.

OVER HEAD TANK WITH WATER

Egg Or Spawn Collection Chamber

A rectangular tank of size 1.0xO.5xO.5 m with water holding capacity of 250 It. The weight of water level maintained in tank is 0.45 m. To drain excess water PVC pipe of 63 mm dia. &150 mm length is fitted at a distance of 38.7 cm from the bottom. The same chamber can also divided into two parts for collecting egg and spawn separately. Egg collection chamber of 1 x1.2x1 m and spawn

collection chamber of 2x1.2x1 m size may be constructed with complete drainage, overflow & screen fixing arrangements.

Brood Raising Programme

Rectangular ponds having an area of 0.2-0.5 ha with average water depth of 1.5 m is preferred for brood raising. Such ponds should be free from aquatic weeds, predators and weed fishes. Methods adopted for eradication of predatory and weed fishes are by repeated netting, dewatering and application of suitable pesticides. Fresh mohua oil cake @2500 kg/ha or bleaching powder@ 300 kg/ha acts as effective pesticides. Density of the brood in raising pond in kept @1500 kg/ha. Conventional supplementary feed such as groundnut cake and rice bran (1: 1) may be given @2% of the fish stock.

Selected prospective spawners are reared for a few months in different ponds at a stocking density of 1,000 kg/ha. Brood may be reared in a pond with principal brood system. Besides, the formulated diet, ponds should be fertilized at a regular intervals to increase natural pond production. The principal brood species system is further a step ahead towards commercial seed production.
Moreover, the feed cost of the brood raising programme is reduced to 40%.The brood stock can be raised with other carps in ponds but the male and female should be separated at least a month before breeding season.

Brooders are regularly fed on artificial diet comprising GNOC and rice bran in 1:1 ratio at 3% of their body weight of total brood stock in the pond. For example, for 100 kg weight of brood stock, the daily feed ratio will be 3 kg. Either this feed mixture could be feed to the fish in the form of balls or pellets placed at particular location at a specific time of the day. This will ensure quick growth of fish and gonads will attain maturity in a specific time for successful breeding operation. Check the brood stock regularly to ensure that there is no disease and the eggs are developing well.

Breeding

Induced breeding technique is responsible for augmenting the carp seed production in our country. There are more than 500 distinct commercial hatcheries in the country producing the carp seed through this technique. These hatcheries adapt both traditional hypophysation and the recent GNRH-based induced breeding methods for seed production.

GnRH-based inducing agent-Based on the concept of hypothalamic peptide (GnRH) mechanism on GtH-1I release, several inducing drugs containing GnRH- analogue and dopamine antagonist have been formulated. These drugs are administered to the brood in a single dose. Usually female broods receives @0.3-05 ml/kg body weight and male brood receives half of the dose of that female, i.e. 0.15-0.25 ml/kg body weight. The synthetic hormone induced brood is released in the breeding hapa or in the eco-hatchery breeding pool.

HAPA Breeding

The fertilized eggs are collected during morning hours. In hapa breeding system, comparatively poor breeding response and more egg loss are recorded than that of hatchery breeding system.

Selection of Brood Fish

Male Brood Fish

- The vent of the male is not projection and deep pit like.
- When you put a slight pressure on the belly during season. It oozes milt.
- Pectoral fin of the male is rough to tough only in some ripple males.

Female brood fish

- The vent of the female is slightly projecting like a small tube with a narrow median slit.
- Like male brood no such fluid is released.
- The females belly is soft and bulging the pectoral fin smooth to touch.

Weight of Brood Fish

After selection of brood each brood should must be weighed in weighing balance properly. The male brood should weigh about 1kg and female should weigh about 1.0-1.5 kg.

BROOD FISH ARE WEIGHED BEFORE INJECTION

Hormone Injection

The common carp brood is induced with synthetic agent like ovaprim at 0.2ml/kg body weight for both female and male in evening time.

Method of Injection

Intraperitoneal injection is common. During injection, a brood fish is placed in a cloth bag, lying laterally in the water. The upper half of the fish is held' above the surface. At the inner side of the basal part of the pectoral fin where it is scale less, the syringe needle is inserted toward the head at an angle of 45° to the body's longitudinal axis and to a depth of about 1.5 cm. The fluid is then slowly injected.

INJECTION TO MALE BROOD

INJECTION TO FEMALE BROOD

Release of Brood

After injecting the brood fish, they are released in to the breeding hapa in the ratio 1 F:2M. Then the egg collectors are filled in the breeding hapa fresh water, higher water temperature stimulate the long segregated males and females of common carp for breeding. The male starts escorting the female fish within a couple of hours of release in the breeding pond. The mating process of common carp continue for hours until the female is not exhausted for hours until the female is not exhausted with eggs. After few hours of mating process the pond turns out calm and quite.

BROOD FISH IN HAPA

4. Observation

Egg Substratum

Release of Eggs

Common carp generally breeds within 6 to 10hrs after being released in the breeding hapa and by morning the egg collectors could be seen with million of eggs having small orange- coloured, shiny and sticking to the weed.

After the breeding is over, the brooders are removed from the breeding hapa and weighed. The difference in weight before and after breeding gives the weight of eggs released. About 12-15% of 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. A 1 kg of female will give about 1.5 lakh of eggs.

The eggs along with the weeds are transferred and spread uniformly into a series of hatching pool. Then the spawners (both male and female) are given a potassium permanganate both and released back in the respective pond to be used again. The males mature quite quickly and can be used again for second time.

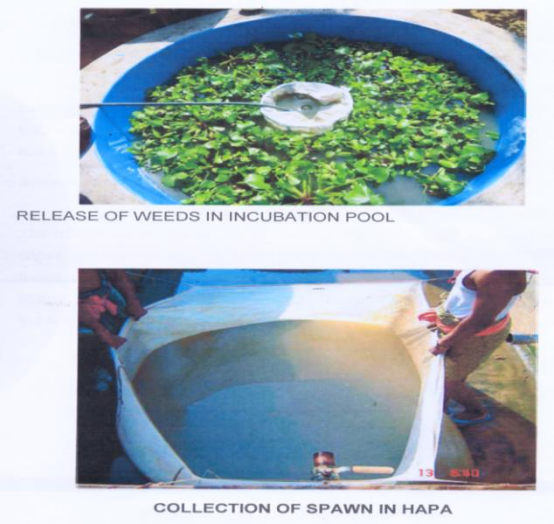
WEED CONTAINING EGGS

ROOT CONTAINING EGG S

Quality of Eggs

About 1 kg of egg collectors carrying nearly 40,000-1, 00,000 eggs are kept in each hapa. The fertilized eggs are dirty pale yellow in colour where as the unfertilized ones are opaque and whitish in colour. So the fertilized eggs are good eggs and unfertilized eggs are bad eggs.

In these breeding the approximately eggs obtained is 7 lakhs After hatching of egg, the spawn production is 5 lakhs so the percentage of fertilization is71.43. Then the spawn production is compared with others.



RELEASE OF WEEDS IN INCUBATION POOL

COLLECTION OF SPAWN IN HAPA

Collection of Spawn

In the incubation pool, spawn delivery pipe is another outlet, which is fixed at the junction of the floor and side wall of the outer chamber.

Four to five days after breeding the weeds *(Eichorrnia* sp) are carefully removed from the incubation pool. The spawn is collected through the spawn delivery pipe in to the hapa. After the collection, they are transferred to hundies containing few water.

To know the quantity of spawn, counting of spawn is necessary. The quantitiy of spawn is measured by perforated cups of known capacity. The number of spawn per cup is

determined as 50,000. By these cup, the total amount of spawn is perfectly counted. Then the spawn production amount is compared with previous breeding experiment.

Water Quality Test

In culture system the growth and survival depends upon the water quality parameters and their management. The water quality parameters are dissolved oxygen, Total alkalinity, carbon dioxide and pH. The water quality of breeding pond were taken.

Dissolved oxygen:

In fish pond water, the concentration of DO must lie between 6-8 ppm when the concentration is found to be 2ppm and above 13ppm, the water is considered as unsuitable for fish growth and culture.

These pond have the DO concentration is 4ppm and showing lesser concentration. By using paddle wheel aerator or by beating water surface with bamboo sticks, DO concentration can be increased.

The fish pond water must contain total alkalinity concentration between 50-90 ppm. Pond water which shows alkalinity concentration below 20ppm and above 130ppm is not suitable for fish growth.

These pond have the total alkalinity concentration is 96ppm. Low alkalinity ponds can be treated with lime.

Carbon dioxide

The ideal concentration of free CO_2 content in pond water is 5-10 ppm. If the concentration is found above 15ppm, then it is not suitable for fish farming due to high CO_2 content and it denotes the presence of algal bloom and macrophytes in pond water. These pond have the CO_2 concentration is 12ppm little higher concentration 1.0 mg/lit of hydrated lime can remove 1.68 mg/lit of free CO_2.

PH

pH is a measure of hydrogen ion concentration in water and indicate how much water is acidic or basic. Water pH affects metabolism and physiological process of fish. Fish pond water must possess the optimum (neutral) value between 6.8-8.2.These pond having pH is 7.5. The pH values between 4-6 and 9-11 is considered as acidic and alkaline. Such acidic and alkaline condition is not favourable for fish culture. Correction of acidic condition of pH may be made by addition of limestone (caco3) 30-40 kg/ha/month.

Sample Collection Oof DO

Water parameter	Ideal range	Concentration of Breeding fond
Do	6-8 ppm	4 ppm
Total alkalinity	50-90 ppm	96 ppm
Carbon dioxide	5-10 ppm	12 ppm
PH	6.8-8.2	7.5

Table showing water quality concentration of breeding Pond.

Rearing of Spawn

The spawn (6-8 mm size) is stocked attains fry stage (20-25 mm size) in about 2-3 weeks time in the nursery ponds. From the nursery ponds, the weeds are removed. Unwanted fish are removed using Mohua oil cake containing 4-60/0 saponin @2000-2500 kg/ha mt. lime is applied @.250-300 kg per ha. Manuring of ponds with cowdungs @ 5000 kg/ha is done. Aquatic insects are controlled suitability of water is tested therefore the ponds are stocked with about 3-4 days old spawn usually in the morning hours. The moderate rate of stacking may be 2530Iakh/ha.

Once the healthy seed of common carp is produced, the seed is stocked in the nursery earthen ponds of suitable area (0.1-1 ha) and reared to marketable size by adoptin~rthe standard culture technique viz. poly and composite culture. Which holder the promise to giving handsome return to the farmers.

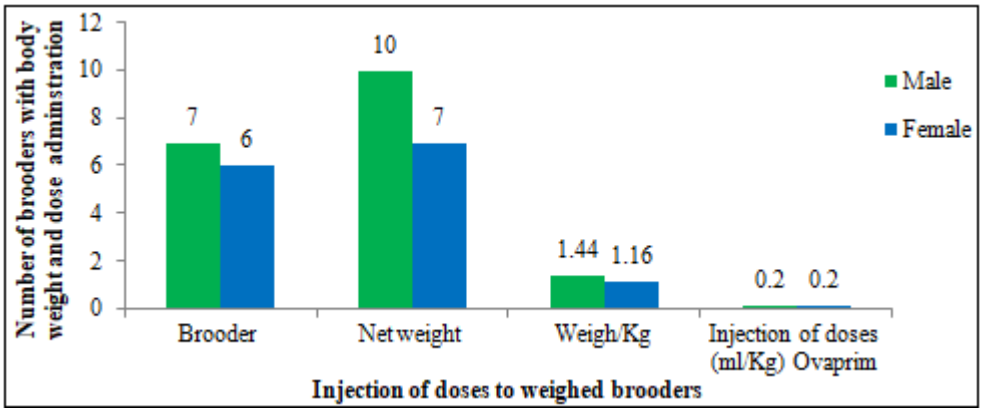
5. Findings

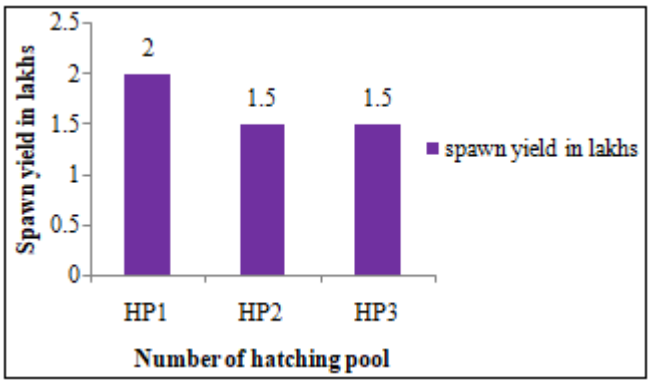
Table 1: (Requirement of hatchery)

		Male	Female
01	Brooder (Cprinus Carpio)	07.nos	06 nos
02	Net weight (k.g.)	10	7
03	Weigh / fish (kg & gm)	2.2.2, 1.8, 1.5, 1,0,9,0,6	2,1,5,1,1,0,8,0,7 gm
04	Injection Doses (ml/kg) ovaprim	0.2	0.2

Table 2: Recovery of Spawn in hatching pool)

No. of hatching Pool	Spawn Yield (Lakh)
HP 1	2
HP 2	1.5
HP 3	1.5
Total	5





6. Discussion

Out of three varieties of exotic species which had made an entry into our country during 60-75s only one species *cyprinus carpio* had faced parallal competition with indigenous Indian major carp. Particularly in the rural sector it has created a good demand and also it is felt by the scientist as well as extension worker that in future economically importance of this species can never be avoided.

This species besides being high marketable values had brought about double the production values. Seed production, survivality of spawns are at high degree and economical viable.

Govt. policy of the state is to be doubled the fish production from present situation to next five years to be achieved this goal. This particular species will play a vital role.

It is seen that through application of induced breeding technology, common carp seed production survibility of seed will definitely increase common carp seed production using weeds as egg collector and ecohatchery not only economises the operation process. From this study this can be concluded that total spawn yield is 5 lakhs.

Once the quality seeds are plenty available to the farmers, Govt. goal to doubling the fish production rate will be surely succeeded.

Common carp breeding will not only help withstanding adverse seasonal conditions but also in increasing fish seed production and providing employment to rural youth enhancing fish production and utilization of particularly small water bodies. Common carp culture will increase the income of fish farmers and thereby improving their socio-economic condition.

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