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Indigenous Techniques of Breeding Indian Major Carps Under Confined Conditions

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ABSTRACT

Breeding and hatching of Indian Major Carps under confined conditions are being practiced on traditional ways since a long time by the fishers of rural Assam. A survey conducted in the lower stretch of river Brahmaputra revealed that breeding and spawning of Indian Major Carps (IMC) under confined water conditions has been made possible by simulating artificial riverine environment to brood fishes using locally available devices and indigenous techniques by the rural fish farmers. The cost of operation was found to be lower than the regular methods of breeding carps in hatcheries. Fertilization rate of eggs released during breeding was successful with 70 to 80 per cent survivability. The breeding technique was found to be simple, handy and farmer friendly and can be executed in remote and furlong areas for a ready availability of fish seeds.

Key Words: Breeding confined water, IMC, Indigenous.

INTRODUCTION

Indian Major Carps (IMC) comes under fishes which do not ordinarily spawn in confined or stagnant water bodies such as ponds, lakes etc. but breed in natural water bodies as in rivers, wetlands, paddy fields and other low lying areas. Environmental factors such as light, temperature, water condition play an important role in stimulating the fish for reproduction (Rath, 2008). Major carps usually spawn in inundated terrains of rivers and streams during rainy season. This spawning site is advantageous for its survival and propagation where the fresh flood kills all terrestrial fauna and flora therein and their decay causes the growth of micro flora and micro fauna on which the fry and fingerlings feeds (Padhi and Mandal, 1994). Moreover, the water in the inundated terrains is warm and rich in oxygen which is essential for rapid embryonic development and hatching (Thomas, 2003). On the other hand, the fish seeds collected from natural spawning grounds is scanty and does not fulfill the annual requirement for inland aquaculture in the country (Ayyappan, 2011). Henceforth, efforts have been paved to artificially breed the IMCs in hatcheries such as Chinese Eco-hatcheries, Portable carp hatcheries, Glass jar hatchery etc. but in all the cases it has been observed that the cost of operation in the hatcheries is quite high. In the present study, an effort was made to investigate indigenous techniques practiced by the rural mass for producing carp seeds in their backyard ponds and culture tanks by simulating a similar environment required for carp breeding with an involvement of negligible investment.

MATERIALS AND METHODS

A survey was carried out by a team of students undergoing Bachelor of Fisheries Science (BFSc) during their tenure of Fisheries Work Experience Programme (FWEP) at Livestock Research Station, Assam Agricultural University, Hekra, Kamrup, Assam. The survey was carried out in 6 villages viz., Chaplai, Dhanbori, Laoduba of Goalpara district and Hekra, Mondira, Malibari of Kamrup districts. Data were collected from the fish breeders of the villages by personal interview, farm visit

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and practical demonstration. Quantity and fertilization rate of eggs was measured by volumetric or gravimetric method.

RESULTS AND DISCUSSION

i. Brood stock management

For breeding of fish and seed production, mature and healthy brood stock weighing 2 to 4 kg are utilized. In the survey, it was found that the fish breeders procure the brood fishes from natural resources such as rivers, streams, wetlwnds and from recognized fish pond owners during months of March and April. The brood fishes are conditioned in hapas in confined water (pond) before being injected with hormones. In case of brooders collected from culture ponds, it is desired that yearlings of required species of carps are collected from natural ground or from farm reared stock. These yearlings are stocked in brood stock ponds for a year or two with proper husbandry practices and bred for seed production. As a preliminary management practice, brood stock ponds are prepared by eradicating aquatic weeds, predatory and weed-fishes and harmful insects. Lime is applied according to the pH of the water (Table 1).

Table 1. Dose of lime applied as per pH of water

pH of water	Dose (kg/ha)
4.0-4.5	700 – 1000
4.5-5.5	500 – 700
5.5-6.5	250 – 500
6.5-7.5	200 – 250

Organic manure and inorganic fertilizers are added to pond to obtain the desired level of plankton. Stocking density is maintained @ 900 to 1100 kg/ha and 1/5th of the water of the pond is replenished at least once in a month. Fish ration provided to the brood fishes consists of groundnut oil cake 70 kg., rice bran 28 kg., common salt 1.5 kg., vitamin C 10g. and vitamin E 3g. Feeding was done @ 3-4% of the body weight once every day.

(ii) Setting of hapa

Two types of hapa are usually used during breeding of fish in confined water which are explained as follows;

a) ***Breeding hapa:*** A breeding hapa is a rectangular shaped structure made up of fine mesh mosquito net cloth or nylon net. The size of the breeding hapa used by the breeders measures 6.5 x 3.5 x 1 m to 4.0 x 1.5 x 0.9 m. However, size of hapa is set according to the size and number of brood fish. All the four corners on upper and lower sides of the hapa are stitched with laces so that the net can be tied to four bamboo poles fixed in the water column at both upper and bottom ends. The hapa is installed in a fully stretched condition in the water column and care is taken so that the upper surface is raised at least 30 to 40 cm above the water level whereas the lower surface does not touch the muddy bottom. The upper surface of the hapa is provided with an opening to keep and remove the brood fishes during breeding operation and for collection of eggs afterwards.

b) ***Hatching hapa:*** It is a double chambered rectangular shaped enclosure. The outer hapa is made of bolting cloth (0.5 mm mesh size) and the inner hapa is made of mosquito net cloth or nylon cloth (2.0-2.5 mm mesh size). The hapa are installed in water by means of four bamboo poles as described for breeding hapa.

(iii) **Pump set and uses:** A pump set of capacity 2 HP or above is installed on a suitable embankment or near the net with the help of a bamboo rack or poles. The pump sets are run by diesel and kerosene oil in areas where electricity supply is poor. Care was to be taken so that lesser noise is produced by the pump sets to avoid failure of the breeding programme. The pump sets helps to release water into the pond at a desired speed for simulating an artificial riverine situation for carrying out the breeding programme under confined water.

(iv) **Breeding methodology:** Mature and healthy male and female brood fish at a stocking density of 2-4 kg/m^3 are put together in the ratio of 2:1 respectively in breeding hapa in the afternoon hours. A riverine environment is simulated by generating a mild water current with the help of water pump. Shower is

provided in the hapas to simulate rain. In the evening hours, water current is stopped and hormone is administered, while shower is continued. Generally, fresh pituitary glands are collected by the breeders from other mature fishes from various sources and an extract is prepared for administration. Females are injected with pituitary gland extract @ 2-3mg/kg body weight as the first dose and 10-12 mg/kg of body weight as second dose after 5 to 6 hrs. of administration of first dose. Half numbers of the males were injected with one dose of pituitary gland extract @ 4-6 mg/kg body weight at the time when second dose is injected to females. The pituitary gland extract is injected either by intramuscular or intraperitoneal method. The water current is restarted with the help of the pump sets. Water speed is maintained at around 0.1-0.2 m/sec. The spawning of each female is completed within 1.0 to 1.5 hrs. of initiation. Water flow and shower are stopped after the spawning is over. Brood fish are collected and released back into the brood stock pond. Fertilized eggs are collected in early morning hours and transferred to the hatching hapa. Normally for IMC optimum temperature is 28 to 30°C and incubation period is 14 to 20 hrs. Water current with speed of 0.01 to 0.02 m/sec is generated. Direction of water current is changed by changing the direction of water inflow. The survivability rate of the spawn is about 70 to 80 per cent. After 70 to 72 hrs. of incubation, the spawn is transferred to earthen nurseries and is reared for 15 to 20 d. till they become fry. The small fries are transported by vendors to different sites as per demand of the local entrepreneurs and farmers.

CONCLUSION

Construction of a regular type circular carp hatchery for IMC breeding and hatching is a major constraint in rural areas due to its high cost of construction, higher water budget and maintenance. Hapa breeding method is cheaper amounting for Rs. 10000/- to 15000/- per season and construction of a circular hatchery accounts for Rs. 6 to 8 lakh. Hapas can be installed at any suitable area and is portable whereas a circular hatchery cannot be dismantled. Moreover water budget in hapa breeding is maintained by reusing the same pond water which is utilized for breeding, hatching and stocking. Usage of water pump has several advantages as it creates an unpolluted environment for the brood fish, mild water current simulating riverine system for fishes to exhibit better courtship behaviour with higher spawning efficiency. An improvement in the indigenous hapa breeding technique can produce quality seeds with better survivability rate. This method can be practiced at farmer's site at low cost and minimizing the difficulty in seed transportation.

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