

BREEDING OF INDIAN MAJOR CARPS AND COMMON CARP
IN SEMI-ARID ZONE OF HARYANA UNDER
CONTROLLED ENVIRONMENT

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ABSTRACT

Vast barren lands are lying vacant in the semi-arid zone of the country which can effectively be utilised for fish farming. Experiments conducted in semi-arid conditions at Damdama indicated that it is possible to breed Indian major carps and common carp under controlled conditions of modern carps hatchery CIFE D-80 without depending on rain.

INTRODUCTION

The construction of new reservoirs for hydroelectricity and irrigation have resulted in increase of water logged areas. In many cases ground water level comes up and make the soil unfit for agriculture. Apart from remedying this situation by improved drainage, it is also necessary to look into more effective land use systems for water logged areas. Such problems were confronted in Andhra Pradesh along Godavari and Krishna canals (Dwivedi, 1984). In Andhra Pradesh such water logged areas which are otherwise unsuitable for agriculture are effectively being utilised for fish seed production and fish based mixed farming which involve horticulture, agriculture, duck keeping and raising of cattles.

A major problem in arid zone for setting up fish seed farms is the prevailing adverse climatic conditions (Jain *et al.*, 1984). Atmospheric temperature attains 45°C during summer and the average rainfall in the region is below 60 cm/year. This climate adversely affect breeding of fish (Hoar, 1959; Chaudhari, 1960 and Ahsan, 1966).

Often due to delay in monsoon ova are reabsorbed in the body or even when breeding takes place egg and spawn do not survive due to high temperature. According to Khan (1945) and Alikunhi (1964) carps breed with in a temperature range of 24 to 31°C.

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MATERIAL AND METHODS

The modern carp hatchery model CIFE D-80 (Dwivedi and Zaidi, 1983) was installed at Damdama (28.4°N latitude and 77°E longitude) fish farm situated in semi-arid zone of Haryana. The hatchery consists of following three units :

1. Sedimentation and oxygenation tank :

The tube well water which is fresh and cool but contains silt particles and poor in oxygen is pumped and stocked in cement cisternes, where silt particles get settled at the bottom and oxygen level increases slightly due to splashing of water.

2. Overhead and cooling chamber unit :

Water is pumped into the overhead tank. Water comes to the pond from a constant height which increases the level of dissolved oxygen.

3. Breeding and hatching unit :

It includes breeding pool, hatchery jar and spawn receptacles.

(a) Breeding pool : It receives good quality fresh water from the overhead tank. Oxygen content of the water increases from 1.8 mg/l (tube-well) to 8.0 mg/l in breeding pool. Water temperature is maintained between 25-28°C. A moderate current of water is also maintained in the system. Matured males and females procured from Damdama fish farm are released in the pool after pituitary gland injection (Chaudhari, 1960).

(b) Hatchery jar : It is the main component of the hatchery where hatching takes place. It receives water from overhead tank which helps in continuous removal of metabolic wastes. Regular flow of water maintains movement of eggs and provides enough oxygen for quick development and reduces the period of incubation.

(c) Spawn receptacles : Hatchlings are collected in the spawn tank where they are kept for 72 hrs. Water is circulated at a low speed in this tank. Spray and aeration are provided to ensure cooling and high oxygenation to maintain optimum conditions for early growth.

RESULTS AND DISCUSSION

Fish bred successfully in the controlled conditions of modern fish hatchery (Table I) with an average fertilisation and hatching rate of 90 and 85 percent respectively. In the month of June 1984 when air temperature was 38°C *Cirrhinus mrigala* bred successfully with 62.5 % hatching. Successful breeding of *Cyprinus carpio* was obtained from February to July 1984 under controlled conditions of hatchery (Table II).

Table 1 : Fish spawn production of different carps under controlled conditions during February-August 1984

Month	Fish	Sets	Total wt. of female (kg)	Temperature Range (°C)			Rain fall (m m)	Egg/Spawn Production (in lakhs)	Survival/Supply (in lakhs)
				Hatchery					
				Air	Room pool	Water			
Feb	Common Carp*	8	21.85	21.5-23.4	19.0-21.0	26.0	12.12	9.70	
Mar	Common Carp**	27	66.35	26.0-34.0	20.0-23.0	26.0	53.96	51.95	
Apr	Common Carp	13	20.35	34.0-38.0	25.0-28.0	26.0	14.25	13.65	
May	Common Carp	1	1.50	40.0-43.0	25.0-30.0	26.0	0.60	0.60	
Jun	Common Carp	1	1.50	35.0-43.0	25.0-30.0	26.0	0.45	0.45	
Jun	Major Carp	1	1.00	35.0-43.0	25.0-30.0	26.0	1.50	0.75	
Jul	Common Carp	2	8.10	32.0-37.5	30.0-32.0	26.0	5.80	4.80	
Jul	Major Carp	36	55.25	32.0-37.5	30.0-32.0	26.0	162.89	94.45	
Aug	Major Carp	10	10.00	32.0-36.0	30.0-31.0	28.0	30.48	11.75	
			99	185.90				282.05	188.30

* *Cyprinus carpio** *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla*

Table II : Factors to be controlled in hatchery for successful breeding and hatching

Factors	Range
Temperature (Environment)	20.0 - 45.0 °C
Temperature (Hatchery)	25.0 - 28.0 °C
Dissolved Oxygen (Hatchery)	7.5 - 8.5 mg/l
pH (Hatchery)	7.0
Turbidity (Hatchery)	Nil
Free CO ₂ (Hatchery)	Negligible

Due to temperature, delay and scanty rains production of fish seed is affected and uncertain in semi-arid zones (Dwivedi, 1984; Jain *et al.*, 1984). Therefore, the problem was to develop a technology for breeding the fish independent of the climatic conditions. Introduction of modern fish hatchery resulted in successful breeding of carps in semi-arid zone where fish is induced to breed under controlled conditions irrespective of atmospheric temperature and rainfall. Certain gonadotropins are released by the pituitary gland of a fish under optimum environmental conditions, which in turn stimulates the fish for breeding. Flooded conditions in a river during rainy season brings down the temperature and increases the dissolved oxygen content of the water. Combined effect of external and internal factors induce the fish to breed. In wild conditions hatching success is less due to other natural hazards and collection of quality seed becomes a problem.

Successful breeding does not take place in natural environment of semi-arid zone owing to adverse climatic conditions. Modern fish hatchery has been tested which provides controlled temperature, desired pH, filtered water, enough oxygen and removal of metabolic wastes during breeding and hatching. Using the modern carp hatchery 188.3 lakhs of carp spawn was produced through experimentation during the year 1984. In adverse climatic conditions the use of modern carp hatchery can solve the problem of carp seed production and this method may be successfully adopted in Rajasthan, Haryana, Punjab and Himachal Pradesh.

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