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"STUDIES ON BREEDING OF COMMON CARP FISH *CYPRINUS CARPIO- L"*

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ABSTRACT

Carp are omnivorous, with a high tendency towards the consumption of benthic organisms, such as water insects, larvae of insects, worms, molluscs and zooplankton. Zooplankton consumption is dominant in fish ponds where the stocking density is high. Additionally, the carp consumes the stalks, leaves and seeds of aquatic and terrestrial plants, decayed aquatic plants, etc. Pond farming of common carp is based on natural food with supplemental feeding of cereals. Daily growth can be 2 to 4% of body weight (bw). Carps can reach 0.6 to 1.0 kg 5 body weight within one season in subtropical/tropical polyculture. Growth in temperate climate is slower, the fish reach 1.5 kg body weight after 3 rearing seasons. Common carp grow well to about 76cm length and weight of about 6.5 kg. Carp are omnivorous, with a high tendency towards the consumption of benthic organisms, such as water insects, larvae of insects, worms, molluscs and zooplankton.

KEYWORDS: *Carp, omnivorous, worms, molluscs, and zooplankton.*

INTRODUCTION

Linnaeus (1758) reported that there was only one species in Europe namely *Cyprinus carpio* which was Danubian wild carp. Later, Kirpichnikov (1967) described four subspecies of wild common carp, the European and Transcaucasian *Cyprinus carpio*, the Middle East *Cyprinus carpio* aralensis, the East Asian *Cyprinus carpio* haematopterus and the South Chinese and Vietnamese *Cyprinus carpio* viridiviolaceus. The common carp (*Cyprinus carpio*) is one of the most economically important freshwater fish species worldwide. Known for its adaptability to various environmental conditions and fast growth rate, common carp has been a popular choice for aquaculture and fisheries. The breeding of common carp is a crucial aspect of sustaining its populations and meeting the demands for both domestic consumption and export. Successful breeding programs aim to enhance desirable traits in common carp, such as growth rate, disease resistance and overall productivity. These programs involve a combination of selective breeding, controlled environmental conditions and advancements in reproductive technologies. Understanding the reproductive biology of common carp is essential for optimizing breeding practices and improving the efficiency of production.

The breeding process typically involves the manipulation of environmental factors such as water temperature, photoperiod, and nutrition to induce spawning. Additionally, artificial reproduction

techniques, including hormonal stimulation and egg collection, play a significant role in ensuring a controlled and successful breeding outcome. Beyond the economic significance, common carp breeding studies often delve into ecological considerations, including the potential impact of carp aquaculture on local ecosystems and the development of sustainable practices to minimize negative environmental effects.

Common carp, *Cyprinus carpio* is one of the promising fish species in the aquaculture sector which belongs to the Cyprinidae family. It is distributed all over the world. It is hardy in nature and can bear variable conditions.The carp culture is popular in India but the shortage of carp seed production is the foremost constraint for marginal farmers. To mitigate this problem breeding and culture in recirculatory aquaculture system may be one alternative. This system can provide fishery opportunities in those places where environment is favorable but water is not sufficient for bigger ponds.

MATERIALS AND METHODS :

Recirculatory system comprised FRP tank having dimension1.5×1.0×1.0m for breeding and rearing of the spawn of common carp. Primarily the tanks were washed with the help of KMnO4 @ 5ppm. Plastic pipes of 25mm diameter were used to prepare an under-gravel filter. The distance between the two pipes was 15cm. Halves incisions were made on pipes. Under gravel, the filter was positioned at the bottom of the tank than 15cm layer of gravels were evenly distributed over it. A submersible water pump having a water pumping capacity of 3500L/hr was fitted with the under gravel filter. The inlet of the pump was fit on the under gravel filter. The help of 25mm diameter pipe expanded the outlet into a plastic made basket with muslin cloth which acts as a mechanical filter and aerator.

Three females and six males brooder were stocked in each recirculatory system for seven days. Maturity of male and female was checked by stripping. After seven days Ovatide hormone was given at 0.3ml/kg for female and 0.1ml/kg for male intramuscularly in a single dose. Hydrilla was spread over the recirculatory tank. The eggs were sticky in nature and stuck on hydrilla. After breeding males and females were separated from breeding tanks. Total spawning was checked by slight pressure applied to brooder.

Fecundity : Total numbers of eggs were estimated by the following formula :
Fecundity = Total ovary weight × Number of eggin sample / Weight of sample
Rate of fertilization : The fertilized eggs remained translucent and unfertilized eggs become white and dead within 2-3 hr. A total of 500 eggs were counted. The fertilization rate was calculated as:
Fertilization rate (%) = (Number of fertilized eggs / Total number of eggs) × 100
Mean rate of fertilization = Sum of fertilization rate / Number of females
Hatching rate: The fertilized eggs were counted on hydrilla and then a piece of net was attached to the hydrilla for counting hatchlings. The following formula calculated the hatching rate:

Hatching rate (%) = (Number of hatchlings / Total number of fertilized eggs) × 100 Mean rate of Hatching = Sum of hatching rate / Number of females Survival rate was measured in different stages, firstly hatchlings to postlarvae stage, post-larvae to fry stage and finally fry to fingerling stage stocked in the system.

Survival rate was calculated in rearing experiment by the following formula: Survival rate (%) = (Number of fish harvested / Total number of fishes stocked) ×100
Water quality parameters: Water quality parameters viz., Dissolve oxygen (mg/l), Free carbon dioxide (mg/l), pH, Total alkalinity (mg CaCO3 /l), Total hardness (mg CaCO3 /l) and Ammonia - nitrogen (mg/l) were determined by followed standard method and procedure APHA (2005). Temperature, DO, Free carbon dioxide and pH were measured morning and evening Kala *et al*. (2019). Temperature of experimental tanks was determined by a digital thermometer. Temperature and Dissolve oxygen were measured daily whereas Free carbon dioxide, pH, Total alkalinity, Total hardness and Ammonia - nitrogen was measured once a week.

DISCUSSION :

Classification (Used by Linnaeus 1758)

Phylum	-	Chordata
Group	-	Vertebrata
Subphylum	-	Gnathostomata
Series	-	Pisces
Class	-	Teleostomi
Subclass	-	Actinopterygii
Order	-	Cypriniformes
Division	–	Cyprini
Genus	-	Cyprinus
Species	-	Carpio

Common carp is an omnivorous fish and as a bottom feeder its main food is benthic organisms like aquatic insects, insect larvae, worms, molluscs and zooplankton. In addition, the fish also consumes leaves and seeds of aquatic and terrestrial plants and a range of other items. The carp finds much of its food by digging in the bottom, causing turbidity in the water. Common carp grows by 2-4% of its body weight daily and typically reaches 0.8kg to 1.5kg per fish after one season in subtropical and tropical regions in polyculture systems. Female common carp matures later than male and spawning starts in spring when the temperature reaches over 170 C. The fecundity of common carp is quite high, 150,000-200,000 eggs per kg body weight. The eggs are adhesive and stick to the substrate after release. Incubation takes 60 to 70 degree days depending on temperature. The hatched fry consumes its yolk and develops a swim bladder, so they can swim and eat external food after three days post-hatch at 200 C.

The common carp is one of the cultured fish species which has the longest history of domestication (Steffens, 1980). The fish has been cultivated in ponds in China as a food fish for nearly three thousand years (Hoffman, 1934). Mass selective breeding programme for better growth and cold tolerance in common carp was firstly analyzed and reported in Russia by Kirpichnikov *et al*. (1974). The programme carried out crossing of cold tolerant Amur wild carp with the fast growing Galician carp and applied individual selection for five generations. There was no evidence for the efficiency of growth rate selection, but the fish improved from 30% to 77% survival over winter. Another mass selection programme in Russia increased 0.5% to 1.4% per generation in growth trait (Kirpichnikov, 1993).

CONCLUSION:

In conclusion, the present study has contributed valuable insights into the breeding aspects of the common carp (*Cyprinus carpio-L*). Through a comprehensive exploration of various breeding techniques, environmental factors and reproductive technologies, we have gained a deeper understanding of the factors influencing successful reproduction in this economically important freshwater species.

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