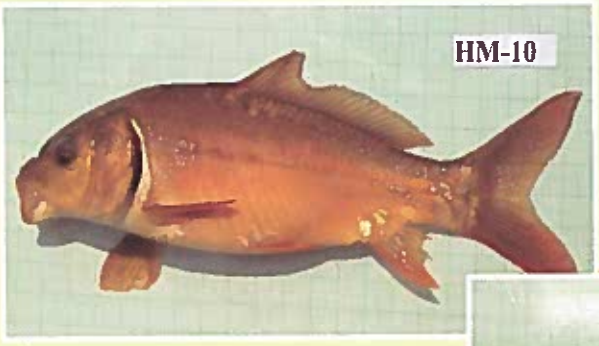
IMPROVED STRAINS OF COMMON CARP FOR COLDWATER AQUACULTURE CHAMPA -1 AND CHAMPA-2



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Foreword

Aquaculture plays an important role in the socio-economic life of the people dwelling in the mountainous zones of the country. The attempts for fish culture in this region have been initiated since 1863, but the culture fishery was taken up with slow pace. In the recent past several progressive farmers have adopted technologies for mono and composite fish culture in mid-hills and have been achieving considerably good production from the small ponds. The Directorate of Coldwater Fisheries Research (erstwhile NRCCWF), Bhimtal, Uttarakhand has played pivotal role in development of location specific feasible and viable fish farming techniques, breeding protocols, feed and standardized husbandry practices at its Experimental Fish Farm, Chhirapani, Champawat (Uttarakhand). Indian major carps do not thrive well in hills due to the low thermal regime. Therefore, Chinese carps found suitable for the Mid-Himalayan region as the candidate species for polyculture.

Common carp is a major candidate species of this culture system. The common carp presently grown in India originated from two introductions, in 1939 (German strain) and 1957 (Bangkok strain). These have become mixed over many generations to give the current stock. This stock of common carp is characterized by early sexual maturation and slow growth rate. This is considered as a serious problem in the culture of this species in mid Himalayan regions. For faster growth and successful aquaculture of this species in coldwater system, it is required to replace the stock with improved strain. Keeping in view, information on improved strains of common carp was collected from worldwide. Two improved Hungarian strains of Common Carp, "Ropsha scaly" and "Felsosomogy mirror carp" was found suitable and the Institute imported these strains at Experimental Fish Farm, Chhirapani, Champawat. The improved strains were reared at Champawat for last two years. The strains have shown positive results with a higher growth rate of about 47 % over existed strains in polyculture system. The strains have also been successfully bred and seeds are ready for further evaluation of location specific growth performance. This document would provide a rare piece of baseline information for

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Introduction

Carps form the main stay of aquaculture in Asia and contribute significantly to inland aquaculture. Aquaculture in India is essentially a Polyculture system with Indian major carps and exotics forming major components. The common carp (*Cyprinus carpio*), an introduced species is an important one which has enhanced fisheries in hill states. It is grown either alone or in polyculture, most commonly with grass carp and silver carp. The common carp presently grown in India originated from two introductions, in 1939 (German strain) and 1957 (Bangkok strain). These have become mixed over many generations to give the current stock. This stock of common carp is characterized by early sexual maturation (at an age of approximately six months and sometimes at a weight below 100 g) and slow growth rate. This is considered as a serious problem in the culture of this species in uplands. Selective breeding of Common carp in Europe to produce a type of carp suitable for culture has resulted in the evolution of four principal phenotypes recognizable in external appearance by their scale patterns. These are mainly scale carp, mirror carp, carp with one row scale and naked carp. Only the scale carp and the mirror carp are considered suitable for culture. Presently, hatchery managers have commonly focused on producing sufficient quantity of seed to achieve fixed targets, with little, if any consideration for the genetic quality of the stocks. Inbreeding, negative selection and genetic drift are likely to have occurred during the long history of domestication of these stocks in such environment. For faster growth and successful aquaculture of this species in coldwater system, it is required to replace the stock with improved strain.

Historical Background

Common carp (*Cyprinus carpio* L) is one of the oldest cultured and most domesticated fish in the world. References can be found to its appearance in Europe in the late glacial epoch and during the Hellenic and Roman Empires mention is made to the keeping and storing of common carp as a particularly favorite dish (Balon, 1974). Culturing and breeding common carp has a long history dating back about 4000 years in China and several hundred years in

Basic Information of Imported Hungarian strains

ROPSHA SCALY (Champa 1)

1. **Origin**

Country	:	Russia
District	:	Leningrad
Developed at	:	Novgorod Fish Farm
Maintenance	:	Novgorod Fish Farm (Russia), FCRI, Szarvas
Introduced into szarvas	:	1982

2. **Breeding history**

The Ropsha scaly carp has been selected from the local homozygote mirror carp by crossbreeding and at present is maintained in the homozygote scaly form. In the North-Russian region (St. Petersburg) the females of selected earlier origin Galician mirror carp were crossed with the males of the Amur wild carp. In the beginning, two parallel crossbreeding were carried out to eliminate inbreeding in later phases. The strain developed in this way and was selected for growth rate and homozygozity of scaliness over six generations. In these crossbreeding the female line R1 (Ropsha 1) and the male line R2 and their combination, the R12 were developed (Kirpichnikov, 1981).

FELSÕSOMOGY MIRROR CARP (Champa 2)

1. **Origin**

Country	:	Hungary
District	:	Balatonlelle
Developed	:	Buzsák Fish Farm
Maintenance	:	FCRI, Szarvas
Introduced into szarvas	:	1967

2. **Breeding history**

Morphological Description

Ropsha Scaly
Scaliness: full scaled, irregular scales in 6%
Colour: Silvery white
Lateral line: generally regular, irregular in 4%
Fins: Regular
Malformations: Degeneration of fins in 8%
Body Shape: deep, elongated.

Felsosomogy Mirror carp
Scaliness: Mirror (Scattred) with high ratio of irregularities (86%)
Colour: golden- yellowish with greenish shed
Lateral line: Typical for the species, irregular (40%)
Fins: Regular with fine structure in the hard rays
Malformations: Degeneration of head and fins in 4%
Body Shape: deep

Scale carp (Bangkok strain)
Scaliness: full scaled, irregular scales in 12%
Colour: golden- White
Lateral line: generally regular, irregular in 16%

Biology of Common Carp

Cyprinus carpio carpio **Linnaeus, 1758 (Common carp)**	
Habitat	Benthopelagic; potamodromous. Inhabit lakes, ponds or slow moving waters, preferably with a muddy bottom;Common carp thrive in large turbid rivers. Common carp are acclimated to a variety of habitats and extremes of environment
Feeding habit	Omnivorous, feeding mainly on aquatic insects, crustaceans, annelids, mollusks, weed and tree seeds, wild rice, aquatic plants and algae; mainly by grubbing in sediments
Breeding	Spawn in marginal, shallow, weed-infested areas. Under tropical conditions carp breeds throughout the year. It is a seasonal spawner in temperate waters. Obligatory plant spawners. The sticky eggs are attached to water plants or other submerged objects. Spawn in spring and summer.
Age & Growth	120 cm SL male/unsexed
Fecundity	200,000 eggs/kg
Remark	A polytypic plastic species with a marked tendency to produce `varieties' and `races' in response to selective breeding and environmental influences

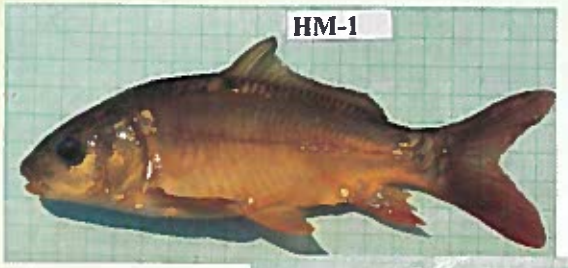
Evaluation of growth performance

Common carp *(Cyprinus carpio)*, an introduced species is an integral component of aquaculture in the uplands. Slow growth rate and unwanted reproduction have been identified as potential constraints on yields of common carp in aquaculture and cultural-based fisheries. The Institute has imported two Hungarian strains at the field centre, Champawat to ascertain their cultivable traits. Existing local strains of common carp were used for study of comparative growth performance and breeding programme.

Felsosomogy Mirror carp

Existing Mirror carp

Experiment was conducted in six cemented ponds (size-75m^2) of pocket "B" at the fish farm, Champawat having sand layer in the bottom (8-10 cm). Experiment was designed for poly culture of common carp with silver carp and grass carp. The stocking density was 2.5 fish/ m^3 density in the ratio of 30:40:30, silver carp, grass carp and common respectively. Hungarian mirror car, Hungarian scale carp and existing scale carp of Bangkok strain was stocked with other exotic carps in double replicates. Highest growth was recorded in Hungarian mirror carp (352gm) under poly culture system followed by Hungarian scale carp (304gm).The growth of the existing strain was low (187gm) in polyculture during the rearing period of one year.



➢ Felsosomogy Mirror carp

352 gm

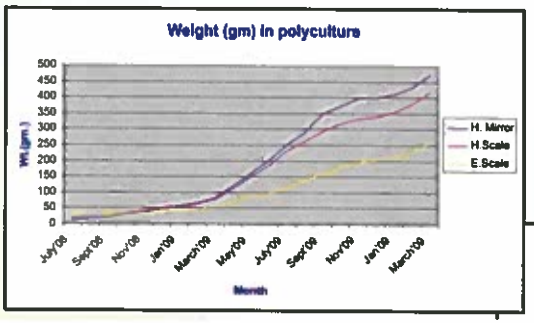
➢ Ropsha Scaly

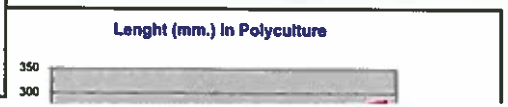
304 gm

➢ Existing Bangkok Strain Scale carp

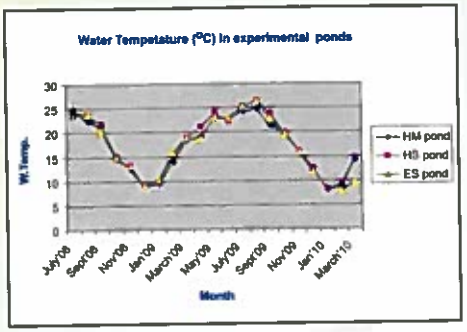
187 gm

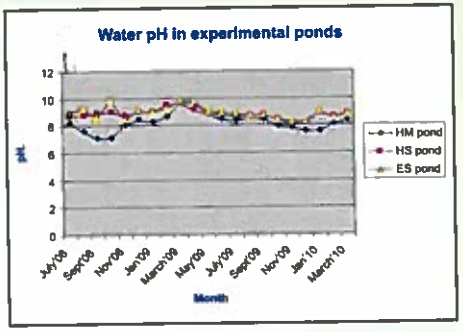
Comparison of Growth performance of different strains

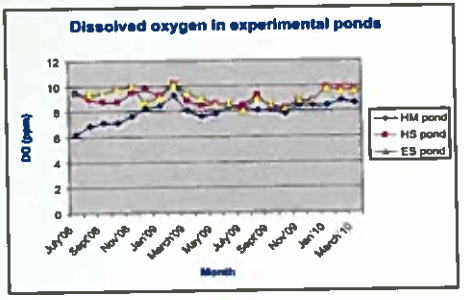


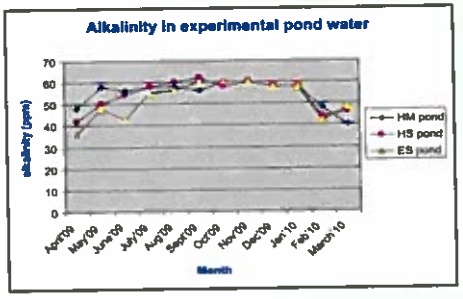


Seasonal variation in Physico-chemical parameters in experimental ponds









Broodstock maintenance and breeding

Brooders of each strain were reared in separate tanks at Champawat center. Early maturity was observed in mirror carp than the scale carp. Breeding of Ropsha scaly was started from 2nd week of April and ended in 3rd week of May at water temperature 16-24°C. Breeding of Felsosomogy mirror carp was started from 1st week of April and ended in 2nd week of May at water temperature 16-22°C. The size of the brooder was 400-500 gms.


Scale carp

Breeding of Hungarian, Ropsha scaly & Felsosomogy mirror Carp

Published By: Dr. P.C. Mahanta, Director

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(Indian Council of Agricultural Research)