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Amur Common Carp- A Good Alternative to Local Common Carp in Farm Ponds of Belagavi, Karnataka

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ABSTRACT

Inland aquaculture enterprise of Belagavi is carp dominated with an average annual production of 6000MT. However, inbreeding depression of major carps and lack of diversity of culture species limiting the growth of the sector. ICAR-BIRDS Krishi Vigyan Kendra, Belagavi has introduced Amur Common carp - a potential strain developed through selective breeding of both exotic and indigenous strains of Common carp at Fisheries Research and Information Centre, Hesaraghatta, Bangalore. Very characteristic feature of Amur Common carp is delayed maturity (8m). Longer maturity period gives sufficient time for body growth. Local Common carp basically attains early maturity (5m) and prolific breeding nature eventually leads to very slower somatic growth. Front line demonstration conducted on comparative growth analysis of Amur common carp v/s local common carp in different water bodies such as earthen ponds, HDPE lined ponds and cement tanks. The demonstrations were carried out for 3 yr during 2012-13 to 2014-15. A total of 15 demonstrations were conducted in 6 villages in the district. Given 9 months for culture period, it was observed that Amur common carp has attained an average size of 820g compared to local common carp (460g) in mono and polyculture. Comparative study of growth analysis in different types of water bodies, both species have performed 10-15 per cent better in earthen ponds compared to HDPE lined and cement tanks due to the availability good quality detritus. Farmers were very much convinced about the Amur which yielded 42 per cent higher than local common carp. Till 2019-20, through training and various extension activities KVK has popularized the Amur strains and also solved the problem of non-availability of seeds by sensitizing the state department of fisheries and regional fisheries research stations. More than 200 farmers have started farming which was the indication of horizontal expansion of technology.

Key Words: Amur, Aquaculture, IMC, Polyculture.

INTRODUCTION

ICAR-Krishi Vigyan Kendra, Belagavi is thriving to serve the farming community of the Belagavi district since 1995. Wide range of interventions in agriculture and allied sector has been carried out in order to solve the district specific problems encountered by farmers. Inland fisheries are one among the major field of operations being addressed by the institute. The biggest district in Karnataka is bestowed with large number of waterbodies that includes 6 rivers, 3 major reservoirs with water spread area 22,626ha, 222 numbers of tanks with water spread area 3,611ha and more than 17,000 numbers of farm ponds with total water spread area around 70,000ha. Indian major carps (Catla, Rohu and Mrigal) and Common carp are the major candidate species of farming in the district. The average fish production during the last decade is 6000MT.

More than 17,000 farm ponds built to store the water for irrigation purpose through various schemes in farmer's field. The sizes of farm ponds range from 400m^2 to 2000m^{2}and some of them are as big as 8000m^2. Although, most of the farm ponds are

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400m^{2}to 500m^2 in size, collectively these perennial farm ponds are the potential resources to enhance the fish production of the districts. Introduction of Amur common carp for higher productivity was carried out to solve the problem of lower growth rate of local common carp. It is unquestionable that common carp is a 'must have' species in composite carp farming because of it's bottom feeding habit and hardiness (Wahab *et al,*1995). Only drawback of this species being diversion of energy from somatic growth to gonadal growth was early and repeated reproduction (Jena *et al*, 2001). Thus, the decrease in growth rate leads to lower yield and thus minimizes the economic benefit to farmers. This problem was addressed by stocking Amur common carp variety which attains maturity only after 9m of culture period and till that point the somatic growth is steadily incremental (Basavarju *et al*,2003). The study intended to evaluate the growth performance of Amur common carp in comparison with local common carp in earthen, cement and HDPE lined farm ponds of Belagavi district.

MATERIALS AND METHODS

Frontline demonstrations (FLD) were conducted by ICAR-Krishi Vigyan Kendra, Tukkanatti, Belagavi in northern dry zones of Belagavi district in villages of three talukas namely Gokak, Athani and Raibag. Amur common carp seeds were sourced from Fisheries Research and Information Centers (Inland), Hebbal, Bengaluru. Local common carp seeds stocked in control tanks were purchased from Department of Fisheries, Hidkal Dam, Hukkeri Taluk. Average size of the seeds stocked was 2 cm and 2 - 2.5 g weight. Fishes were stocked at the rate of 1 fish per m^2.

A total number of 15 demonstrations were conducted to evaluate the performance of Amur common carp in comparison with local common carp. The criteria for selecting farm ponds for the demonstrations were; a. Ponds having the water availability throughout the year. b. Water quality parameters must fulfill the requirement of standard aquaculture practices (Water quality parameters were tested). Based on the results of the demonstration Amur common carp was popularized till 2019-20 through training and extension activities by the KVK.

Farming system

Amur common carp was tested in different pond system such as HDPE lined farm ponds, earthen farm ponds and cement tanks. This breed was tested in both monoculture and polyculture sytems. In polyculture, catla, rohu and Amur common carp versus catla, rohu and common carp were stocked at the rate of 4:3:3. Comparative study with local common carp was done in all three system i,e HDPE, earthen and cement tanks separately in order to strictly avoid the confusion between two varieties. Local common carp was also cultured in both poly and monoculture for comparative growth assessment.

Pond preparation

Earthen ponds were treated with lime 2000kg/ ha/yr in three phases (once before stocking and twice post stocking). Cement and HDPE lined ponds to which 2 inches of red soil applied before stocking in order to regulate carbon and nitrogen cycles. Manuring with cowdung@1000 kg/ha/m was done to produce the primary productivity in the water bodies. Inorganic fertilizers were not used in any of these irrigation waterbodies due to the concern over development of algal bloom that might blocked the drip pipes connected for irrigation of agriculture lands. The other reason can be attributed due to perceive of the farmers towards organic farming and resistant to apply any inorganic fertilizers. In order to keep the parameter uniform in all types of water bodies, only cow dung manuring was performed to enhance the plankton production in all types of culture systems.

Feeding and management

Conventional feeding was used in this demonstration comprising 1:1 wheat or rice bran and groundnut oil cake @ 5% of the bodyweight for the initial month and reduced to 4% of the body

Amur Common Carp

Table2: Mean weight (g) of Amur and local CC in monoculture condition

Year	I year	II year	III year
Amur	645.45±12.76	718.86±7.61	815.34±16.16
Common carp	469.26±9.41	479.43±8.39	431.02±7.35

weight from the 2nd month onwards. Exchange of about 10 - 20% water was regular activity in the farm ponds. Water was drawn out from the depth 6ft or below so that planktons in the water body were not pumped out. Regular filling of water helped in maintaining optimum dissolved oxygen in the water body. Average culture period of 9m was taken into consideration for the growth assessment. Harvesting of stock was done during end of May every year when water level in ponds was reduced and allowed for complete harvesting.

RESULTS AND DISCUSSION

Performance of Amur in monoculture

In monoculture practice, Amur common carp performance was significantly higher (p0.05) than local common carp. Year wise growth performance of Amur and local common carp is depicted in the Fig. 1 and Table 2. Amur common carp has attained the mean weight of 726 ±5.6 g in 9 months where as local common carp gained 460±12.1g.

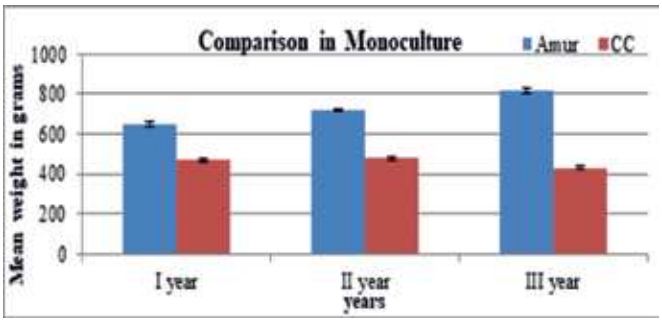

Fig.1:Mean weight (in gm) of fish in monoculture

Performance of Amur common carp in polyculture

Amur common carp was found to be good candidate species for poly culture with other IMCs (Table 3 & Fig. 2). Amur common carp attained mean weight of 724±8.3g where as local common carp gained 499±6.5 g of mean weight. Amur common carp growth was 45.09 per cent higher than local common carp which was significant (p0.05).

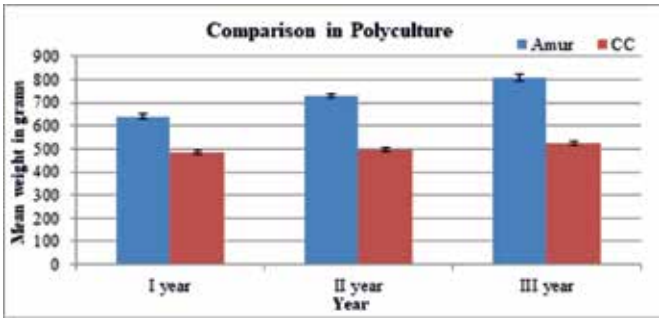

Fig.2:Mean weight (in gm) of fish in polyculture

Growth evaluation in different types of water bodies

Three types of farm ponds i.e., earthen, HDPE lined and cement tanks provided different environment for fishes. Regular exchange of 10-20 per cent of water was common in all three water bodies as they were constructed with the purpose of storage and supply of water to crops. Although supply of fresh water ensured optimum dissolved oxygen (DO), pH and other parameters

Table 3: Mean weight (g) of Amur common carp and local common carp in polyculture condition.

Year	I year	II year	III year
Amur	638.75±11.66	726.93±8.83	809.09±14.68
common carp	484.43±8.88	495.80±7.84	522.95±7.80

Table 4:Mean weight (g) of fish with standard error under different types of pond.

Type of pond	HDPE		Earthen		Cement	
	Amur	CC	Amur	CC	Amur	CC
I year	511.29±8.70	381.77±8.67	708.39±14.98	540.32±10.38	730.38±12.40	488.85±12.62
II year	663.23±16.80	419.03±17.43	756.13±18.51	526.13±26.61	740.77±14.37	495.77±12.79
III year	711.94±11.27	407.74±17.08	996.77±21.65	465.16±12.99	722.31±16.54	418.08±14.67

in optimum range, primary productivity was negatively impacted due to continuous exchange of water. Primary productivity in monoculture has not much role to play as Amur common carp and local common carp are both bottom feeder. However, in poly culture systems, continuous exchange of water has a negative effect on catla and rohu who were dependent on phyto and zoo planktons (Milstein *et al,* 1992). The present study focused mainly on Amur common carp and common carp, the growth performance of other species was not considered.

Mean weight gained by Amur common carp and local common carp in three different types of water bodies is furnished in the Table 4. Both Amur common carp and local common carp performance in earthen pond was significantly higher (p0.05) than other two types of pond system. In addition, both in monoculture and polyculture, both Amur common carp and local common carp have shown highest growth in earthen ponds. This was due to availability of different detritus fauna at pond bottom (Rahman *et al*, 2006). Earthen ponds also facilitated feeding of detritus through burrowing feeding nature of Amur common carp and common carp (Verma *et al,*2018). Although 2-3 inches red soil covered on the bottom of cement and HDPE lined ponds for proper management of carbon and nitrogen cycles, availability of detritus was not as high as earthen ponds. As a result, growth rate in cement and HDPE lined ponds was marginally lower (10-15%) compared to earthen ponds.

Amur common carp was bought from FRIC, Bengaluru and cost of the seeds were Ru.1.00 per seed whereas the cost of local common carp was Ru. 0.25. Due to higher seed cost and transportation cost, cost of production for Amur common carp farming was higher. Except this, all other cost was same for all types of water bodies in both mono and polyculture. In spite of higher cost, benefit cost ratio (BCR) was favorable in Amur common carp (5.8) compared to local species (4.4). This can be attributed to higher yield of Amur common carp (5.4t) against local common carp(3.8 t).

Popularization of Amur common carp

After three years of demonstration, Amur common carp have been intensively promoted in Belagavi district by Krishi Vigyan Kendra through trainings, extensional activities. More than 35 training programmes and field days were conducted to impart advanced technologies/varieties in inland



aquaculture such as Amurcommon carp. However, availability of seeds was the major constraint in this region. Amur being bred and reared mainly in Bengaluru, demand fromfishermen of southern part of the state is higher. Efforts have been made to start breeding Amur common carp in different breeding centers belonging to State Department of Fisheries across the state. Now, the seeds were made available every year in Fisheries Research and Information Center of Bijapur which was an adjacent district to Belagavi. More than 200 fish farmers have availed the Amur common carp seeds for farming and thus horizontal spread of the technology was being achieved.

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