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## Economics of seed rearing and farming of carps

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### Abstract

Till recently, carp seed rearing and farming at any scale was highly profitable because of the low inputs costs. But it no longer continues, as the cost of basic inputs like cow dung, poultry manure, ground nut cake, rice bran and land costs are increased by many folds while the gate value of the fish seed and fish remained almost constant. This assessment was carried out in 258 villages of Southern Karnataka and found out that fish seed rearing for 50 days, the BC ratio in catla 1.59, rohu 2.91, common carp 2.05 and grass carp 3.4. The return on investment (RoI) is high in grass carp (2.61) followed by rohu (2.32), common carp (1.81) and catla (1.52). In fish culture for 10 months period, the BC ratio in feed based farming was 1.05 as against 0.47 in conventional feed based system and 0.53 in extensive method. The RoI was 0.86, 0.61 and 0.29 in feed based, conventional feed and extensive method respectively. In second year, the RoI was increased to 2.05, 1.47 and 1.53 respectively. Though the rates of inputs vary from place to place, the present study gives the economic trend so that farmers, entrepreneurs can plan their scale of operation based on the resource and capital.

**Keywords:** Fish seed rearing, BC Ratio, Return on Investment

### 1. Introduction

Though aquaculture production models are highly dynamic, unless we assess the economics and understand the scale of economy of any given activity, system will not sustain. In early sixties, most of the aquaculture production systems were extensive of modified extensive systems. Rice bran, ground nut cake (GNC) and cow dung was available at cheaper cost. The cost of GNC in 1983 was Rs. 3.80 and it is Rs. 40/kg in 2014. The cost of rice bran was Rs. 1.60 and it is Rs. 18-20/kg now. Whereas the cost of fish seed was 28 paise or Rs. 280/1000 seeds and even now it remained around the same price. Since supply and demand remained constant, the cost of seed never went up. On the other hand, farmers and entrepreneurs tend to go under great loss by investing in aquacultural activities without understanding the economics of seed production and fish farming in ideal condition. Many of the research results lack the critical evaluation from the economic edge and do not find a place in the field.

The total fry production in India was estimated at 632 million in 1986-87 which had increased to 18.5 billion in 2002-2003 and in 2005-06, it was over 22.6 billion. Quantified data on larger size fingerlings and/or yearlings are not available, although it is much needed for grow out culture. Fish seed production includes egg to spawn production for 3 days, spawn to fry nursing for 15-20 days, fry to fingerling rearing for 60-90 days and fingerling to yearling rearing for 8-9 months. Thus the carp seed may be categorized at its final size into spawn (6-8 mm size), fry (20-25 mm size), fingerlings (100-150 mm size) and yearlings (100-200 g weight) (Radheyshyam, 2010).

Construction of fish ponds vary with place to place depending on the soil type, topography, capital and culture activity. There are different methods of construction viz. step-up ponds, dug out ponds, plastic lining tanks, trench method etc. The cost of construction is highly variable. The rates as per Public Works Department (PWD) SR rates are fixed as per the region and soil type. Going by PWD rates will be exorbitant. To know the range of cost of construction, in this study, about 6 different soil category were chosen and the average of 28 different sites are taken for the results.

### 2. Materials methods

The survey was carried out in 258 villages of Mandya District of southern Karnataka, India. Multiple aquaculture interventions were implemented in these villages under Ratreeya Krishi Vikasa Yojana (RKVY).

Fish Farmers of the district are actively involved in the fish culture practices and aqua-ecological, soil and climatic conditions and others are homogeneous throughout the district. A baseline survey was conducted to collect the information about carp culture scenario in the study area. Participatory Rural Appraisal (PRA) tools were employed to identify and prioritise the field problems.

Survey was conducted for 50 days and 10 months for carp seed production and farming respectively. During the survey, detailed information about fixed cost, variable cost, production level and other parameters were collected.

### 3. Results

**Table 1:** Fish Economics of fish seed rearing for 50 days

Particulars	Qty. required for 1 ha	Unit cost (Rs.)	Total Cost (Rs.)
<b>Fixed cost</b>			
Pond construction	10000 m <sup>2</sup>	12/m <sup>2</sup>	80,000-1,20,000
Pipelines and sluice gates		2/m <sup>2</sup>	20,000
<b>Total</b>			<b>1,40,000</b>
<b>Operational Cost</b>			
Deweeding, bund compaction	25 man days	200/person	5,000
Lime	200 kg/ha	5/kg	1,000
Fish spawn (Catla/rohu/common carp/grass carp)	Stocking @ 500/m <sup>2</sup> = 50 lakh	1000/lakh	50,000
Feed (Rice bran and ground nut cake in 1:1 ratio)	1875 kg Ground Nut Cake & 1500 kg Rice Bran	42/kg GNC & 20/kg for RB	1,08,750
Labour for feeding other maintenance	50 man days	150/day	7500
Raw cow dung	4 t/ha in 4 split doses	1/kg	4,000
Harvesting expanses	12 man days	250/person	3,000
Transportation of inputs			15,000
Watch and ward, Miscellaneous			10,000
<b>Total</b>			<b>2,04,250</b>
<b>Production/ha (In 50 days)</b>	<b>Production</b>	<b>Unit cost (Rs.)</b>	<b>Gross Revenue (Rs.)</b>
Catla @ 30% survival	15,00,000	0.35	5,25,000
Rohu @ 40% survival	20,00,000	0.40	8,00,000
Common Carp @ 50% survival	25,00,000	0.25	6,25,000
Grass carp @ 30% survival	15,00,000	0.60	9,00,000
<b>Profit by Species</b>	<b>Net Returns (Rs.)</b>	<b>BC Ratio</b>	<b>Return on Investment</b>
Catla	3,20,750	1.59	1.52
Rohu	5,95,750	2.91	2.32
Common Carp	4,20,750	2.05	1.81
Grass Carp	6,95,750	3.40	2.61

### 4. Discussion

A serious lacuna in the country is availability of economics of respective species culture data. For any business planning or growth analysis, current or the latest data is necessary and unfortunately an organized/authentic data assessment system does not exist. In addition, business planning and market assessment would not be effective on old data because of the rapidly changing aquaculture scenario. In the recent years, The Indian economy, inflation rate has been increased gradually and cost of ingredients and fertilizer are also increased. This intern affected the cost of production or profit in fish culture practices. But, we have very limited economic information is available for carp seed rearing and farming. Therefore, we have conducted the survey on economics of seed rearing and farming of carps with reference to basic input. This was done for economic efficiency with combination of technical and allocative efficiencies.

#### 4.1 Seed Rearing

In the study, we assessed 258 villages of Southern Karnataka with an average 2000 m<sup>2</sup> pond area. The ponds were

prepared according to standard management practices. Stocking was done at 500/m<sup>2</sup> of fish spawn (Catla/rohu/common carp/grass carp) and reared for about 50 days. We have collected the data of fixed cost and operational cost for the seed rearing. The study revealed that, fixed cost is about for Rs. 1,40,000/ha and operational cost is about Rs. 2,04,250/ha required for the 50 days seed rearing period. According to Kumar *et al.*, (2008) study states that, hatchery is a lucrative operation and the returns increased with increase in hatchery size. Taking all hatchery (Small, Medium and Large) sizes together, the variable input cost is about 30,054, 12,511 and 14,533 US \$ in India, Bangladesh and China respectively. In another study, variable cost for the carp seed rearing is about Rs. 59,000/ha in India. The difference in the variable cost of seed rearing might be due to the increase in the basic inputs like cow dung, poultry manure etc. When we compare our study with the previous studies, it reveals that, the variable cost has been increased over a years.

In our survey, Net profit of fish seed rearing among the species reared (catla, rohu, common carp and grass carp) were highest in grass carp following by others. The BC ratio

of catla is 1.59, rohu is 2.91, common carp 2.05 and grass carp is 3.4. The return on investment is high in grass carp (2.61) followed by rohu (2.32), common carp (1.81) and catla (1.52). According to CIFA, net income of about 46000/ha/crop can be obtained by carp seed rearing practice. The profit from the carp hatcheries (small, medium and large) is about 50,224 US \$ and rate of return is about 167.1%.

#### 4.2 Fish culture

Several authors reported that, carp culture was profitable. But, we need to conduct annual survey on economics of fish culture on region basis, variation in price of the basic input. In earlier days, rice bran, ground nut cake (GNC) and cow dung etc are available at cheaper rate. But, now, the cost of GNC of Rs 3.80/kg (1983) has been increased to Rs. 40/Kg in 2014. The cost of rice bran was Rs 1.60/kg and it is Rs. 18-20/kg now. This shows that, over a period of time the cost of input has been increased but there is no remarkable increase in price of table fish. Our survey revealed that, the fixed cost is about 1,40,000/ha/crop, Operational cost is about Rs. 1,02,000/ha/crop. But, the distributions of variable and fixed cost are similar for all the culture system

(Commercial feed based, Conventional feed based and Extensive method). Among variable cost, the cost of feed and seed are the most important item, it determines the yield and profit.

The production is obtained from commercial feed based culture system is about 3500 kg/ha/crop, Conventional feed based culture system is about 2500 kg/ha/crop and extensive method (without feed) is about 1200 kg/ha. Gross income of about Rs. 2,10,000 for commercial feed based culture system, 1,50,000 for Conventional feed based culture system and 72,000 for Extensive method. Net returns is about 1,08,000 for commercial feed based culture system, 48,000 for Conventional feed based culture system and 25,000 for Extensive method. This clearly shows that, the profit is more in commercial feed based culture system followed by conventional feed based culture system and Extensive method. The net income obtained in the present study is more than the Farm business income reported in carp culture in leased – out ponds in the Thanjavur district, Tamil Nadu, India. The variation of net income could be due over the years, the price rate of basic input and market price of table size varied significantly. Therefore, it is necessary to conduct the economics of carp seed and farming on every year.

**Table 2:** Economics of fish culture for 10 months

Particulars	Qty. required for 1 ha	Unit cost (Rs.)	Total Cost (Rs.)	
<b>Fixed cost</b>				
Pond construction	10000 m <sup>2</sup>	12/m <sup>2</sup>	80,000-1,20,000	
Pipelines and sluice gates		2/m <sup>2</sup>	20,000	
<b>Total</b>			<b>1,40,000</b>	
<b>Operational Cost</b>				
Deweeding, bund compaction	25 man days	200/person	5,000	
Lime	200 kg/ha	5/kg	1,000	
Fish seed (Catla + rohu+ common carp and grass carp in 4:2:2:1 ratio)	Stocking @ 1/m <sup>2</sup> = 50 lakh	0.5/seed	5,000	
Feed (Rice bran and ground nut cake in 1:1 ratio)	1000 kg Ground Nut Cake & 1000 kg Rice Bran	42/kg GNC & 20/kg for RB	62,000	
Commercial feed with 24/4	2000 kg	25/kg	50,000*	
Raw cow dung	8 t/ha in 16 split doses	1/kg	8,000	
Harvesting expanses	12 man days	250/person	3,000	
Transportation of inputs			5,000	
Feeding, Watch and ward, Miscellaneous			25,000	
<b>Total</b>			<b>1,02,000</b>	
<b>Production by culture system</b>	<b>Production kg/ha</b>	<b>Unit cost (Rs.)</b>	<b>Gross Revenue (Rs.)</b>	
Commercial feed based	3500	60	2,10,000	
Conventional feed based	2500	60	1,50,000	
Extensive method (no feed, watch and ward) Exp.=47,000	1200	60	72,000	
<b>Profit by culture system</b>	<b>Net Returns (Rs.)</b>	<b>BC Ratio</b>	<b>RoI</b>	
Commercial feed based	1,08,000	1.05	I year	0.86
			II year	2.05
Conventional feed based	48,000	0.47	I year	0.61
			II year	1.47
Extensive method	25,000	0.53	I year	0.29
			II year	1.53

#### 5. Conclusion

Based on the results of these experiments, it can be concluded that though the fish seed rearing and farming is profitable, the margins are very narrow. Since the input costs

and labor costs are increasing significantly, one must know the availability resources, capital and the projected profit before starting of the fish farming activity.

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