



Economic performance of *Pangasius hypophthalmus* at different feeding level in Chitrakoot district of UP

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Abstract

A field study was conducted to find out the production cost and return of culture of *Pangasius hypophthalmus* at two locations in the district. The purpose of this assessment is to compare the Yield and income at different input level in earthen pond at two locations of Chitrakoot district of UP, India. The assessment was conducted to evaluate the yield and net income of pangasius at different feeding level in earthen tank. There are three study locations, the cultivable area was 0.1ha containing one pond at KVK, Center (Site-1) and two ponds (Site-2 and Site -3) of 0.1 ha each in Village hardauli of Pahadi Block. The average body weight of fingerling of 5.0gm were stocked at 4 individuals per sqm at KVK and Farmers field respectively and feed with commercial available feed. The result indicated that the growth performance were 257.1 gm in 273 days at site 1(KVK), 675.25 gm at site 2 and 650.22gm at site 3 (Farmers field) with specific growth rate (%) of 1.443, 1.797 and 1.782 respectively. The FCR was found 1.41 at KVK site, and 1.27 at farmers field (Site-1) and 1.30 at Farmers field (Site-2) culture site. The obtained results indicated that the best growth performance of Pangas was found at Site (1) when feed with Higher quantity of feed i.e. 49800 kg which was more than site -2 that is 45120 Kg feed during culture period. The B:C ratio of total fish production was 1.57 at KVK site-1, and 1.48 and 1.43 at Farmers field (Site-2) and (Site-3) respectively. The economic performance indicated that the maximum benefit can be taken by feeding of optimum quantity of feed to be applied at specific interval at minimum cost. The per Kg production cost is higher at KVK site was Rs.76.48 than Farmers pond (Site-1) and (Site-2) i.e. Rs.60.98 and 62.98 Per kg respectively. The farmers Applying higher quantity of feed 18.24 and 16.52 Kg feed per day and getting more production and income where KVK site-1 applied 4.73 Kg feed per day resulting low yield.

Keywords: Feed, Yield, Income, growth

Introduction

Fisheries sector is a significant part of the Indian economy, contributing to both national income and food security. The Fish production plays a key role toward filling the global food requirements in the form of fish selfish and other aquaculture produces. It has witnessed substantial growth, particularly in aquaculture, leading to increased fish production and exports. This sector has significant role in poverty alleviation, employment generation and livelihood enhancement, food security and sustainability. India is the third largest fish producing country globally, with inland fisheries being the major contributor. The government is actively involved in promoting the sector through policies like the Pradhan Mantri Matsya Sampada Yojana (PMMSY), Mukhya Mantri Matsya Sampada Yojana (MMMSY) which focuses on sustainable fisheries development and technological advancements. large-scale aquaculture, particularly of the Pangasianodon hypophthalmus species (often referred to as Pangasius or Payasi), began in India in the mid-1990s [8], with seed stock introduced from Thailand through Bangladesh. *Pangasius* was introduced in India during 1995-96 from Thailand through Bangladesh. The poly culture of Pungasius made easy to culture in Indian environment due to its compatibility in Indian environment. The Culture of *Pangasius*, has emerged as one of the major fish variety in freshwater aquaculture system of southern states. The Annual fish production of India has been increased from 24.72 lakh tones in 1980-81 to 174.42 Lakh tones in 2022-23 with Average annual production growth rate of 7.98% (Hand book of Fisheries statics 2023) [1]. Uttar Pradesh is the

third largest fish producing state of the country. Andhra Pradesh is one of the largest fish producing state in the country.

Pangasius catfish considered in many countries as one of the most successful aquaculture species due to its relative ease in culture, high-market demand, and suitability to local climate conditions (Rahman, 2005; Rahman and Ali, 2012) [2, 3]. *Pangasius hypophthalmus* fish culture, is a significant and growing aquaculture practice in India. These fishes are widely cultivated in ponds, seasonal tanks, and other water bodies, with polyculture and high-density culture methods. Fish farmers of Andhra Pradesh have initiated the pond farming of *Pangasius* since the year 2004, The species is known for its fast growth and high yield potential, making it a popular choice for Indian fish farmers. The pangasius culture in India has got significant growth, in the past decade, with a steady increase in culture by small and marginal farmers. FAO report presented that the average pangasius productivity was about 10-15 ton/ha (FAO 2014b). During 2004, this catfish species was introduced in Andhra Pradesh after west Bengal where it took to massive production. Due to its higher productivity and faster grow rate, pangasius culture spread from West Bengal to Bihar, Tamil Nadu Odisha and now in Uttar Pradesh. Culture of *Pangasius* has been officially admitted in Indian waters by Govt. of India in 2009 [5] through formulation of guidelines (NFDB, 2009) [5]

Pangasius culture is a not popular in UP aquaculture sector due to its high cost of cultivation susceptible to environmental condition. *Pangasius* species growing faster and hardier in nature. On a global basis, Vietnam has been

the major producing and exporting country of Pangasius in the world. Andhra Pradesh is the top pangas producer state in India, although considerable potential exists in many areas of northern India given freshwater resources in this area. India is the second largest producer of fish through aquaculture, after China. The aquaculture is an important source of food, nutrition, income and livelihood of Indian population. Inland fish production constitutes about 75 percent of the total fish production of the country and annual growth rate of production has also been high. The higher production cost and lower market price leads to switch back to the production of carps farming system. The commercial production of pangasius was only carried out in ponds and small enclosures. The Government of India popularizing pangasius culture in earthen pond, Biofloc and recirculatory aquaculture systems under blue revolution programme under PMMSY.

The package of practices of pangasius culture is similar to that of IMC culture system. Pre and post stocking management practices are applied as IMC culture system. Grow out culture takes place for about 7-9 months due to high mortality and poor survival in extreme cold weather. Pangasius farming is one of the fastest growing aquaculture industries in India, and northern states are among those with the fastest growth. Pangasius production occupies West Bengal 14%, Andhra Pradesh 56%, Bihar 19% and total area covered 42900 hectare in India (A.B. ChMohan, et.al).

Materials and Methods-

The study was conducted from two locations of Chitrakoot district of Uttar Pradesh on culture of pangasius hypophthalmus at KVK, Ganiwan farm (Site-1) and farmers field at Hardauli village of Pahadi Block (Site-2 and 3). The culture was conducted in 0.1 ha area at each location with the average water depth 1.75m. Before stocking, the pond drying was done properly and exposed in sun light for 10 days. After drying the pond was get manured with cow dung and treated with lime @ 200 kg /ha and water filling was completed 15 days before stocking of pangas fingerlings. All the ponds was situated in the same block namely pahadi. At each site fishes were stocked at the rate of 40000 fingerlings per hectare after treating with KMNO₄ and acclimatize for one day in a separate tank. The Fingerling were bought from a West Bengal through local vendor and stocked into the study ponds. A commercial pelleted feed was used containing 30% crude protein and 5% lipid was fed at the rate of 8% of the body weight per day during the first Month, 30% crude protein and 5% lipid at 6% body wt during the second Month, 28 % crude protein and 4% lipid containing feed was used at 4% body wt. during Third month and 2 to 1.5% thereafter. The feed was given twice daily, in morning and evening hours in half of the calculated dose. The quantity of feed was calculated biweekly according to the weight gain of the fish by taking average weight of 30 fish. The fish growth and feed utilization efficiency of Pangasius Hypophthalmus was evaluated using specific growth rate (SGR), B:C ratio and feed conversion ratio (FCR) indices. The income and expenditure was also calculated for all the locations. At the end of the culture period before starting winter season after reaching average water temp below 15 °C, the fishes were harvested and marketed. A simple Yield and economic study was done to find out the Yield and economic return in each study pond. The cost of cultivation was calculated and the net

return was finding out by getting difference between the gross return obtained from sale of fish and the total cost of expenditure involved. The cost in Rupee's per unit of yield was calculated and was expressed as the cost in Rs/kg and per ha of fishes produced. Uttar Pradesh earn better pricing because access to highly populated markets such as Delhi. Others states such as Punjab, Himachal Pradesh and Haryana have stopped pangasius farming for now because of poor margins. Pangasius fish attain better growth in ponds with sub-standard water quality and grow to market size quicker than Indian carps and Chinese carps.

Results and Discussion

According to the United Nations' Food & Agriculture Organization (FAO) in its 2019 annual report freshwater aquaculture production including pangasius will represent 62% of global aquaculture production by 2030. A field study was conducted to find out the yield and profitability performance of river cat fish Pangasius hypophthalmus in earthen pond at different feeding level in district chitrakoot of Bundelkhand agro climatic zone of Uttar Pradesh at three locations, The pond size were 0.1 ha area each at KVK, Chitrakoot Site-1 and at farmers field Site -2 and 3. As we are aware that this cat fish spp. has poor survival during cold weather season when water temperature goes below 15 °C, but this temp observed during the period of November to mid-February. The culture of pangasius falls in between Last February to Mid November 2024 in the study pond. The ponds were Dried, Sun opened and well prepared and stocked with pangasius_hypophthalmus fingerling with average individual weight of 5.0 gm in all locations. The stocking density was kept 4 individuals /m² at all sites. The feeding was done by using commercial floating feed with protein level 30% and lipid 5% during first two month and their after use of 28/4 protein/Lipid ratio. At Site-1 Total yield obtained 9170 kg/ha with average weight 257.1 gm and the feed consumption was 12900 kg. The gross income was Rs. 1101070/- Per culture season of 273 days. With net profit of Rs. 290750/-. The benefit cost ratio is 1.57. whereas at farmers field (Site-A) The total yield was obtained 39210 Kg/ha with the Individual weight of 675.25 gm. The total feed consumption was about 49800 Kg/ha The gross income was obtained about Rs.3538710/- per ha with net profit of Rs.1147690/ha with cost benefit ratio of 1.48. At Farmers Field Site-B, The total per hectare yield was obtained about 34700 Kg with an individual growth of 650.22 Gm. The total feed consumed at site-B was 45120 Kg/ha with gross income of Rs 3225140/- in 273 days culture period. The B:C ratio of site -B was remains 1.43 The FCR of all the sites Like 1,A and B was found 1.14,1.27 and 1.30 Respectively. The result of study indicated that due to less quantity of feed availability the growth is not obtained up to the desired level at KVK Pond (Site-1). The per ha yield was 9.17 ton per ha when fishes were feeded with 12.9 ton per ha whereas the yield at farmers field (Site -A)was 34.7 ton/ha where fishes were Feeded with 49.8 ton per ha and At Site -B the total Yield was 34.7 ton by feeding of 45.12 ton feed per ha in 273 days culture period. The net profit was found higher at higher feed consuming site- 2 than Site-3 and Site -1 at KVK pond. The specific growth rate was also higher at Site -2 i.e. 1.979 than Site-3 i.e.1.787 and Site -1(KVK pond) i.e. 1.443. The yield can be achieved up to 50 ton/ha by proper stocking and feeding management. Production per hectare per year in

Pangasius culture in ponds is known to range from 7 to 50 tonnes (Griffiths *et al.*, 2010)^[7]. At lower feed consumed pond(Site-1) the total yield and individual weight is less than higher feed consuming pond A and B that was 257.1gm and 675.25 gm at site- 2 and 650.22 gm/individuals at Site-3 respectively. Pangasius requires commercial floating feed to achieve expected growth-to-market-size. The feed given to fishes at KVK pond was at limited quantity which probably yielded less production of fishes. The production cost of per Kg fish production was found Rs. 76.48, Rs. 60.99 and Rs. 62.98 at site-1, site -2 and site-3 simultaneously. Holm *et al.*, 1990^[8], expressed that when

considering fish density, food availability is crucial. An Indian farmer chooses cheapest feed options to save costs. Pangasius are cultured both intensively with commercial feeds, semi intensively (with limited feed), and in extensive (no feed) polyculture with it ability for both tilapia and carp (Ahmed *et al.*, 2010)^[9]. The cost is higher at site -1 is poor growth of fish resulting low yield probably due to lesser quantity of feed provided. The Prices for floating feed can vary depending on the quality and quantity the protein/fat percentage/size. Farmers in chitrakoot uses their floating feed at higher prices because no supplier is available nearby market.

Performance indicators

| Study pond | Date of stocking | Area(ha) | Density/ha | Culture Period (Days) | Initial Wt (Gm) | Final wt. (Gm) | SGR (%) |
|------------|------------------|----------|------------|-----------------------|-----------------|----------------|---------|
| Site -1 | 21-02-2024 | 0.1 | 40000/ha | 273 | 5.0 | 257.10 | 1.443 |
| Site -2 | 25-02-2024 | 0.1 | 40000/ha | 273 | 5.0 | 675.25 | 1.797 |
| Site -3 | 25-02-2024 | 0.1 | 40000/ha | 273 | 5.0 | 650.22 | 1.783 |

Per Unit Economic performance

| Study pond | Yield Kg/unit area | Feed consumed (Kg) | Expenditure (Rs) | Gross return (Rs) | B:C ratio | FCR | Cost/kg(Rs.) |
|------------|--------------------|--------------------|------------------|-------------------|-----------|------|--------------|
| Site -1 | 917 | 1290 | 70132 | 110107 | 1.57 | 1.41 | 76.48 |
| Site -2 | 3921 | 4980 | 239102 | 353871 | 1.48 | 1.27 | 60.99 |
| Site -3 | 3470 | 4512 | 218541 | 322514 | 1.43 | 1.30 | 62.98 |

Economic performance/ ha

| Study Pond | Yield/ha (Kg) | Expenditure/ha (Rs) | Gross return/ha (Rs) | Net Return Rs. /ha |
|------------|---------------|---------------------|----------------------|--------------------|
| Site -1 | 9170 | 701320 | 1101070 | 399750 |
| Site -2 | 39210 | 2391020 | 3538710 | 1147690 |
| Site -3 | 34700 | 2185410 | 3225140 | 1039730 |

Challenges

In Bundelkhand their is no pangasius seed producing hatcheries and suppliers available which leads to poor quality and high priced seed. Due to poor survival in winter season there is only one culture season March to October available for getting good production. Poor storage facility liable to lowering of price of marketable fishes. Costly commercial fish feed and other input cost leads to high cost of cultivation in respect to IMC culture system. In coastal states their are lower input cost than northern states, resulted higher competition of sale price. Lack of proper knowledge and skill of farmer regarding its stocking, feeding and farm management practices and they misguided by suppliers and unauthorized vendors.

Conclusion

In view of above findings of this study, it may be suggested that there is need of proper knowledge and Skill development training and dissemination of scientific package of practices to reduce cost of production and getting maximum production. There is a need of good quality seed production hatchery of pangasius fish at nearest locality. The Major cost comes on commercial feed, so, there is requirement to establish feed production and marketing factory in the local area, cold storage near the producing areas are to be required. High production cost needs financial support for fish farmers to fulfill financial requirements. This is recommendation of that optimum feed supply may leads to maximum benefit, so farmers should

stock good size, appropriate stocking density per cubic meter area. Limited feed supply produces less weight gain in earthen ponds leads to low market price. Farmers are advised to cultivate Pungasianodon hypophthalmus fish in small earthen ponds with optimum stocking density, appropriate quantity of feed and fallow all prescribed package and practices.

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