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Growth performance of pangasianodon hypophthalmus at different stocking density in Chitrakoot district of UP

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Abstract
A Field study was conducted to find out the optimum yield and profitability by the culture of Pungasianidon hypophthalmus at two stocking density. The purpose of this study is to compare the growth performance at different stocking density in earthen pond at two locations of Chitrakoot district of UP, India. The study was conducted to evaluate the yield, growth and net income of pangasius as well as the stocking density for optimum growth in earthen. There are two study locations, the cultivable area was 0.1 ha and 0.25 each pond at KVK, Ganiwan in Pahadi Block and Village Itwa in Ramnagar Block. Average body weight was 4.95 and 5.0 gm fish were stocked at 5 and 1.6 individuals per sqm at KVK and Farmers field respectively and feeded with commercial feed. The result indicated that the growth performance were 207 gm in 244 days at site 1(KVK) and 640 gm at site 2 (Farmers field) with specific growth rate (%) of 1.667 and 1.989 respectively. The FCR was found 1.19 for both the culture site.The obtained results indicated that the best growth performance of Pangas was found in Site 2 when stocked with 1.6 individuals /Sqm. The B: C ratio of total fish production was1.23 and 1.48 at site 1 and site 2 respectively. The economic performance indicated that the maximum benefit can be taken stocking of pungas seed @20000 fingerling/ha at minimum cost. The per Kg production cost is higher at site-1 than Site -2 i.e. Rs.97.37 and 81.25 respectively.

Keywords: Density, income, growth

Introduction

The fisheries sector plays a key role toward filling the global food requirements in the form of fish selfish and other aquaculture produces. This sector has significant role in poverty alleviation, employment generation and livelihood enhancement, food security and sustainability. *Pangasius* was introduced in India during 1995-96 from Thailand through Bangladesh. hardy life and its compatibility to poly culture made easy to culture in Indian environment. The *Pangasius,* has emerged as one of the major fish variety in freshwater aquaculture system of south Indian states. Andhra Pradesh is one of the largest farmed–fish producing state in the country. Fish farmers of Andhra Pradesh have initiated the pond farming of *Pangasius* since the year 2004, with a view to diversify their carp-based aquaculture, and to harness its high yield potential for domestic as well as export market. As per the FAO report the average pungasius productivity was about 10-15 ton/ha (FAO 2014b) [1]. P. hypophthalmus was first introduced into India from Bangladesh in West Bengal. Thereafter in 2004, the catfish species was introduced in Andhra Pradesh where it took to massive production. Due to higher productivity and faster grow rate, striped catfish culture spread from to West Bengal to Bihar, Tamil Nadu and Odisha. Culture of Pangasius has been officially admitted in Indian waters by Govt. of India in 2009 through formulation of guidelines (NFDB, 2009) [2].

Pangasius culture is a not very common in India's aquaculture system. This 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. India permitted pangasius culture in 2007 to replicate Vietnam in growing pungasius fish. Andhra Pradesh is the top pungas producer state in India, although considerable potential exists in many areas of northern India given freshwater resources in this area. India is the third largest fish producing country in the world and accounts for 7.96 percent of the global production. The aquaculture continue to be an important source of food, nutrition, income and livelihood of Indian population. India is also a major producer of fish through Aquaculture and ranks second in the world after China. 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 commercial production of pangasius was only carried out in ponds, and farmers had started to switch back to the production of carps because of the consistent lower prices for pangasius and high cost of production. From last few years Government of India initiated promotion of pungasius culture in earthen pond, Biofloc and re circulatory aquaculture systems.

Culture and management of pangasius is similar to that of Indian major carp culture. Cattle dung, Lime, poultry manure, single super phosphate and urea are applied as IMC culture system. Grow out culture takes place for about 7-9 months due to poor survival during winter season. Pangasius farming is one of the fastest growing aquaculture industries in India, and northern states are among those with the fastest growth. Production of pungasius occupies West Bengal 14%, Andhra Pradesh 56%, Bihar 19% and total area covered 42900 hectare in India (A.B. ChMohan, *et al*) [3]

Materials and Methods

The study was conducted from two locations of Chitrakoot district of Uttar pradesh on culture of pungasius hypophthalmus at KVK, Ganiwan farm (Site-1) and farmers field at Itwa village of Ramnagar Block (Site-2). The culture was conducted in 0.1 and 0.25 ha area with the average water depth 1.75m. Before stocking of pond drying was done properly and kept open in sun light for 15 days. After plough the pod was get treated with lime @ 250 kg /ha and water filling was completed 15 days before stocking of pungas fingerlings. Each two nearby ponds was considered to be situated in the different block like pahadi and Ram Nagar. At site-1 fishes were stocked at the rate of 50000 fingerlings per hectare and at farmers field (Site-2) fish fingerling was stocked at the rate of 20000 individuals /ha. The Fingerling were bought from a local vendor and stocked into the study ponds. A commercial palleted feed was used containing 28% crude proten and 5% lipid was fed at the rate of 8% of the body weight per day during the first Month, 6% during the second Month, 4% During Third month and 2% thereafter. The feed was given twice daily, one half in the morning hours and the half in the evening hours. The amount of feed given was adjusted biweekly according to the weight gain of the fish.The fish growth and feed utilization efficiency of Pungasius 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 both the site. At the end of the season, the ponds were drained and the fishes were harvested and measured. A simple economic study was done to find out the economic return in each study pond. The total cost of expenditure was calculated and the net return was determined by the difference between the gross return obtained from sale of stock and the total expenditure cost. The cost in Ruppes per unit of yield was calculated and was expressed as the cost in Rs/kg and per ha of fishes produced.

Results and Discussion

A field study was conducted to find out the optimum stocking density, suitability, yield and profitability performance of river cat fish pungasianodon hypophthalmus in earthen pond at KVK, Ganiwan (Site-1) and at Itwa village farmers field (Site-2) at different stocking density, The pond size are 0.1 ha area at KVK and 0.25 ha area at farmers field. As we aware that this fish spp. has poor survival during winter when water temperature goes bellow 15^0C, but this temp observed during the period of November to mid February. The culture period was falls in between April 2022 to November 2022. The pond is well prepared and stocked with pungasianodon hypophthalmus fingerling with average individual weight of 4.95 gm in both locations. The stocking density was kept 5 individuals /m^2 at Site-1 and 1.6 individuals /m^2 at farmers field (Site-2). 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 10100 kg/ha with average weight 207 gm and the feed consumption was 12000 kg. The gross income was Rs. 12.12 lac. With net profit of Rs. 228560/-. The benefit cost ratio is 1.23. whereas at farmers field (Site-2) The total yield was obtained 12800 Kg/ha with the Individual weight of 640 gm. The total feed consumption was about 15200 Kg/ha The gross income was obtained Rs.1536000/ha with net profit of Rs.496000/ha with cost benefit ratio of 1.48. The FCR of both the site was found 1.19. The result of study indicated that due to high stocking density growth is not obtained up to the desired level at KVK farm (Site-1). The per ha yield was 10.1 ton per ha when fishes were stocked at 50000 fingerling per ha whereas the yield at farmers field (Site -2) was 12.8 ton/ha where fishes were stocked at 20000 seed per ha. The net profit was also found higher at low stocking density than higher one stocked at KVK pond (Site-1). 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) [4]. At higher stocking density the total yield and individual weight is less than lower stocking density bearing pond that was 0.207gm and 0.64 gm/individuals respectively. The per Kg production cost was Rs. 97.37 and 81.25 per Kg at site-1 and site -2 simultaneously. The cost is higher at site -1 is due to cost of seed and management aspects.

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. Striped catfish (Pangasianodon hypophthalmus) was introduced into Andhra Pradesh by seed sellers from West Bengal, India as early as 1995 (Ramakrishna et al., 2013; Singh and Lakra, 2012) [5]. Pangasius requires commercial floating feed to achieve expected growth-to-market-size rates. The feed given to fishes at KVK pond was at lower rates which probably yielded less production of fishes. Wyban *et al* (1988) [6] indicated that stocking density, growth rate, survival rate and market price are the most sensitive factors to increase profit. Improvement of one of these factors sometimes may create undesirable side effects, for example, intensification of cuhure system, i.e. stocking density requires high food energy expenditure. Similar finding given by Holm *et al*., 1990 [7], when considering fish density, food availability is crucial. Indian farmers chooses cheapest feed options to save costs. Prices for floating feed can vary depending on the quality and quantity the protein/fat percentage/size. Farmers in chitrakoot uses their local feed because they can't afford higher prices of floating feed and it is also not available in local market.

Table 1: Performance indicators

Study pond	Date of stocking	Area(ha)	Density	Initial Wt (Gm)	Final wt. (Gm)	Specific growth rate
KVK Pond	05/04/22	0.1	5	4.95	207	1.667
Farmers Pond	01/04/2022	0.25	1.6	5.0	640	1.989

Table 2: 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.)
KVK Pond	1010	1200	98344	121200	1.23	1.19	97.37
Farmers Pond	3200	3800	260000	384000	1.48	1.19	81.25

Table 3: Economic performance/ ha-

Study Pond	Date of Harvesting	Yield/ha (Kg)	Expenditure/ha (Rs)	Gross return/ha (Rs)	Net Return Rs. /ha
KVK Pond	15/11/2022	10100	983440	1212000	228560
Farmers Pond	30/11/2022	12800	1040000	1536000	496000

Challenges

In north India their is no pangasius seed producing hatcheries which leads to bad and high priced seed. There is only one season March to October because of the colder temperatures they can not survive. Their are lack of cold storage which are liable to lowering of price. Costly fish feed and medicine enhances the input cost. In Andhra Pradesh their are lower input cost than northern states, resulted higher competition of sale price. Lack of proper skill and knowledge to farmer regarding its stocking, feeding and farm management practices and they misguided by several cheaters.

Conclusion

In view of above findings of this study, it may be suggested that there is need of Skill oriented training and dissemination of scientific production technologies to reduce cost of production and getting maximum yield. It is also needed good quality seed hatchery of pungasius fish nearby locality. The maximum input cost comes on commercial feed, so, there is very much essential to establish feed processing unit in the local area, cold storage near the producing areas are to be required and due to high production cost financial support for fish farming is needed to the farmers. This is recommended that optimum stocking density may leads to maximum benefit, so farmers should stock good size and approprate quantity of seed per squire meter area. Higher density produces less weight gain in earthen ponds of Uttar Pradesh. Farmers are advised to cultivate Pungasianodon hypophthalmus fish in small earthen ponds with optimum stocking density and fallow all prescribed package and practices. This system is costly so, resource rich farmer are advised to adopt it.

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