Agro Economist - An International Journal
Citation: AE: **8**(02): 165-168, December 2021
DOI: 10.30954/2394-8159.02.2021.11

AAEBM
ASSOCIATION OF AGRICULTURAL ECONOMICS & AGRI-BUSINESS MANAGEMENT

Input Use Pattern and Resource Use Efficiency of Pond Fish Production in Kalyan Karnataka

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Received: 20-09-2021 **Revised:** 29-11-2021 **Accepted:** 13-12-2021

ABSTRACT

Inland fish production, particularly in pond culture, is gaining importance in Karnataka owing to batter irrigation facilities and the government support in the form of various schemes such as Krushi Honda and others. This paper analyzes the resource use efficiency in pond fish production in NEK region of Karnataka. The data collected from sixty fish rearing farmers in ponds in Kalyan Karnataka region in 4 districts namely, Bellary, Kalaburagi, Bidar and Raichur using snowball technique method is used. The tabular analysis for input use pattern and cob-Douglas production function for use efficiency was used. From the findings it evident that fish production in ponds is labor intensive activity and thus provides scope for employment opportunity in the area. Human labour, feed cost and manure were found to be major contributing factor of fish production and positively and significantly contributed in pond fish production in the region. Feed was the only variable was used optimally in the fish production, however , labour, seed, fertilizer, lime and manure were over utilized, Hence, appropriate and adequate training or extension programme need to be tailored through the line departments and relevant agencies on production technology.

Keywords: Resource use efficiency, allocative efficiency, pond fish production, inland fish production

Aquaculture is considered to be one of the vital sectors for economic development of Karnataka and has witnessed an impressive growth from a traditional activity to a commercial activity. The state has 5.60 lakh ha of inland waters comprising 2.93 lakh ha of major and minor tank, and reservoirs with an area of 2.67 lakh ha besides 5813 km length of rivers, which provide an immense scope of development of inland fisheries. Fisheries sector has gained importance in the state and national economy as a source of nutritious food, foreign exchange and employment. The average annual growth rate of inland fish production in Karnataka was estimated to be around 8.85 per cent from 2004 to 2014. The major Inland fish producing districts in Karnataka are Ballari,

How to cite this article: Halli, P., Satihal, D.G., Patil, S.S., Hiremath, G.M. and Shivashankar, N. (2021). Input Use Pattern and Resource Use Efficiency of Pond Fish Production in Kalyan Karnataka. *Agro Economist - An International Journal*, **08**(02): 165-168.

Source of Support: None; **Conflict of Interest:** None

Davangere, Hassan, Mandya, Mysuru, Shivamogga, Tumkur and Raichur (Anon, 2015; indiastat 2016). Fish production in the state can be increased either by increasing water area under fish culture or by increasing productivity of fish culture or by both. In the recent past, iInland fish production, particularly in pond culture, is gaining importance in Karnataka as well as Kalyan Karnataka region owing to batter irrigation facilities and the government support in the form of various schemes such as Krushi Honda and others. Over utilization or underutilization of resources results in inefficiency and lowering of productivity. The efficient use of resources through proper allocation and control will not only increase the productivity but also profitability of the farms. Literature review suggest lack of scientific studies or knowledge about the efficiency of resource use which in turn can reduce the expenditure on inputs to be used in the process is very limited (Bhatt 2004; Bhuyan *et al.* 2013). This paper to analyzes in put use pattern and the resource use efficiency in pond fish production in NEK region of Karnataka which may help policy makers and Government of Karnataka to take measures for improving fish production and productivity in the state.

Methodology

The paper uses the primary data collected from 60 fish farmers from 4 districts in Kalyan Karnataka region namely, Bellary, Kalaburagi, Bidar and Raichur using snowball technique method 2019. The data collected on utilization of various inputs and pattern of use was analysed by tabular analysis. The statistical tool of Cob-Douglas production function was used to analyze resource use efficiency in pond fish production as presented below

$$Y = a\ X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5}\ e^u$$

Where, Y = Returns (₹/acre); X_1= Labour cost (₹); X_2= Feed cost (₹); X_3= Fertilizer cost (₹); X_4= Lime cost (₹); X_5= Manure cost (₹); X_6= Seed cost (₹); a = Constant; b_1 to b_6 are elasticity coefficients of respective inputs. The equation was converted into the logarithmic form; it assumed a log linear equation as under.

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + u$$

Where, u stands for error term.

RESULTS AND DISCUSSION

Input use pattern in pond fish production

The details of input use pattern in pond fish production was collected during the survey and is post tabulated and is presented in (Table 1). The farmers in the study area purchased fish fingerlings mainly from such as reservoirs from Hospet, Narayanpur, Bijapur (veterinary research station, Bhootnal) and Bidar. These fingerlings were purchased at ₹ 1 for each fingerling. On an average 6078.33 fingerlings were released per acre of pond.

Table 1: Input use pattern in pond fish production

Sl. No.	Particular of input	Quantity used per acre	Average price (₹/kg or piece)
1	Seeds/fingerlings (No.)	6078.33	1
2	Labour man days/ acre	148.6516	265.48
3	Feed (kg/acre)		
	a) Rice bran	2498.30	07.02
	b) Ground cake	804.452	20.14
	c) Maize brawn	1876.27	15.31
4	Fertilizer (kg/acre)	76.68	18.52
5	Lime (kg/acre)	273.23	5.48
6	Farm Yard Manure (kg/acre)	3139.16	0.22

The labour use pattern comprised of owned labour and hired labour resulted in 149 man days per year. Labours were mainly used for fish feeding, weeding, watch and ward, fish catching etc. therefore, the input use pattern suggests that, fish production in pond is labour intensive activity and thus provides scope for employment opportunity in the area.

The detail about other inputs suggests cow dung (Farm Yard Manure), maize brawn, rice bran, groundnut cake were the major inputs used for in fishh production. Around 3139.16 kg of cow dung was used per acre to stimulate the growth of both phytoplankton (algae) and zooplankton (daphnia and crustaceans). Rice bran was other major input used at the rate of 2498.30 kg/acre to the fishes. Fertilizer and lime which are used in fish production were at negligible quantity. Fertilizer is used as supplement feed to the fish to reduce the cost of

organic feeding. Lime being the water purifier also adjusts the pH level of the pond water and is even used as natural coagulant.

Resource Use Efficiency of Pond Fish Production

The main objectives of any production unit are better co-ordination and utilization of various resources to realize greater returns, hence the productivity of various resources used in the fish production to understand whether or not the factors of production were used optimally. (This was analyzed on per acre basis).

The Cobb Douglas production function was used to study resource use efficiency in fish production per acre. For calculating resource use efficiency, six factors namely labour cost (X_1), feed cost (X_2), fertilizer cost (X_3), lime cost (X_4), manure cost (X_5), and seed cost (X_6) were considered to assess the impact of these factors on dependent variable (gross income). The details of production function estimates, P-value of their coefficient and co-efficient of multiple determination (R^2) are presented in table 2.

Table 2: Resource use efficiency of pond fish production

Sl. No.	Variables	Regression coefficients	P value
1	Intercept	0.32	0.0014
2	Human labour cost (₹)	0.64*	0.0023
3	Feed cost (₹)	0.91*	0.0156
4	Fertilizer cost (₹)	0.34	0.0553
5	Lime cost (₹)	-0.13	0.4540
6	Manure cost (₹)	0.28*	0.0021
7	Seed cost (₹)	0.55	0.6393
8	R^2	0.78	

The significant coefficients of multiple determinations (R^2) implied that 78.00 per cent of variation in fish production returns was explained by the 6 variables included in the module under pond fish production. The regression coefficient of human labour (0.64), feed (0.91) and manure (0.28) were found positive and highly significant. Even though, the coefficients of fertilizer (0.34) and seed (0.55) costs were positive, but statistically non-significant. It is interesting to note that coefficient of lime (-0.13) was negative and statistically non-significant. The feed, human labour and seeds (fingerlings) emerges as important factors, which have contributed positively and significantly to fish production in ponds in the study area

The findings are in corroboration with study conducted on resource use efficiency and constraints in fish production in Bislapur district of Chhattisgarh, by Durga Singh (2017), which suggests that in the production function analysis seeds, manuring, protection and labour contributed positively in increasing the gross profit of fish farmer.

Allocative efficiency of fish production

The resource use efficiency analysis assumes greater importance in ascertaining whether production at the farm level and the region could be increased profitability to an optimum level by making reallocation of existing resource use pattern.

Table 3: Allocative efficiency of fish production of sample farmers in study area

Sl. No.	Explanatory variable	Parameter	MVP: MFC
1	Human labour cost (₹)	b1	0.76
2	Feed cost (₹)	b2	1.12
3	Fertilizer cost (₹)	b3	0.45
4	Lime cost (₹)	b4	-0.17
5	Manure cost (₹)	b5	0.35
6	Seed cost (₹)	b6	0.65

The direct production function was used to test the efficiency of different production inputs in the fish farming. The Marginal Physical Productivity (MPP), Marginal Value Product (MVP) and profitability ratio (MVP/MFC) were calculated at the geometric mean level of various production inputs and output levels. The opportunity cost (FC/OC) of labour, feed, fertilizer, lime, manure, and seed were actual cost at prevailing rate in the study area. Since input variables were measured in monetary term and opportunity cost was unity. It is evident from the Table 3 that MVP to MFC ratio for all the inputs viz., labour (0.76), fertilizer (0.45), lime (-0.17), manure (0.35) and seed (0.65) were found to be less than 1. The findings suggest that only feed was efficiently used in fish production. However, Marginal Value Product to Marginal Factor Cost ratio in labour, fertilizer, manure, and seed found to be near to the unity indicating the insufficient use of these resources.

This suggests that there is scope of increasing these inputs for obtaining optimum output.

CONCLUSION

It can be concluded from the study on resource use efficiency in pond fish production that the efficient use of resources through proper allocation and control will not only increase the productivity but also profitability of the farms. From the findings it evident that fish production in ponds is labor intensive activity and thus provides scope for employment opportunity in the area.

Among these variables, human labour, feed cost and manure were found to be major contributing factor of fish production which have positively and significantly contributed in pond fish production in the region. Feed was the only variable was used optimally in the fish production, however , labour, seed, fertilizer, lime and manure were over utilized, Hence, appropriate and adequate training or extension programme need to be tailored through the line departments and relevant agencies on production technology.

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