Original Research Article

Yield performance of *Pangasius sutchi*with carps under composite fish culture in farm ponds of Dakshina Kannada, Karnataka

ABSTRACT

Farm ponds are the major water storage facilities available for the farming community and majority of the farming community face scarcity of water during the summer months. Dakshina Kannada being the coastal district, majority of the population is dependent on marine fisheries for fish nutrition. Fish is being the staple animal food in the district, people preferred marine fish in all the seasons. KVK has demonstrated several technologies in the district from the past two decades but composite fish culture in farm ponds has been one of the most effective to the farming community to accept, adopt and spread the technology. Demonstration on Composite fish culture of carps with *Pangasius sutchi* using farm ponds was carried for three years in various parts of the district. *Pangasius sutchi*under composite fish culture with carps exhibited better growth with a mean growth of 0.948±0.33, 0.961 ±0.20 and 0.901±0.16 kg during 2019- 20, 2020-21 and 2021- 22 respectively. *Pangasius sutchi*and Catla performed better in terms of growth in farm ponds under the composite culture system giving more benefits to the farmer. The total yield varied with a minimum of 68.45 qtl/ ha in 2020- 21 and a maximum of 72.69 qtl/ha during 2019- 20.

Key words: *Pangasius sutchi,* composite culture, farm pond, KVK, Carp

1. INTRODUCTION:

Dakshina kannada is amaritime district of Karnataka with 4770 sq km of geographical area extending between 12.86" longitude and 75.25" latitude. Mangaluru is the district capital and the district is bound by sea from the west and WesternGhats from the east. The Topography of the District is undulating and the average altitude of the district is 30 metres above Mean Sea Level.The district has around 64 km coastal length with four rivers Nethravati, Gurpura, Payaswini and Kumaradhara flowing. Beside many small rivers Nethravati is considered as the major river with religious importance and also serve as a major source for drinking purpose. The district has small reservoirs, natural tanks, wells and farm ponds. Farm ponds are the major water storage facilities available for the farming community and majority of the farming community face scarcity of water during the summer months. Krishi Vigyan Kendra, Dakshina Kannada was established in the year 2004, functioning under host institution Karnataka Veterinary Animal and Fisheries Sciences University, Bidar. The District is characterized by high rainfall (4000 mm mostly received during June to October) High temperature (Max-36.2^{o}C and Min 20.4^{o}C) and high humidity (84.5 to 96.5%). Soils are lateritic and acidic in nature. KVK. Dakshina Kannada is serving as a knowledge and resource center of agricultural technologies for the farming community to enhance their livelihood. The district has a literacy rate of 88.57% and majority of the farming community has zeal towards the adoption of new farming technologies. KVK deals with area specific technologies in the district, which will combat the issues faced by the farming communities. KVK identifies the area specific problems and bridges the gap in-between the farmers and the scientific practices.

Dakshina Kannada being the coastal district, majority of the population is dependent on marine fisheries for fish nutrition. Fish is being the staple animal food in the district; people preferred marine fish in all the seasons. The district has vast water resources in terms of farm ponds and natural tanks which are sparingly used for inland aquaculture. KVK has demonstrated several technologies in the district from the past two decades but composite fish culture in farm ponds has been one of the most effective to the farming community to accept, adopt and spread the technology. There is great scope for inland fish production in the district with effective utilization of available resources in a smaller and medium scale. The fisheries extension plays a vital role in taking up of the farmer oriented technologies and the key to success of such technologies depends on problem specific, resource friendly and effective to the

problems faced (Shukla, 2022). Demonstration on Composite fish culture of carps with *Pangasius sutchi*using farm ponds in the district was carried for three years in various parts of the district.

2. MATERIALS AND METHODS

Dakshina Kannada being a coastal district and horticulture crops are the major source of income to the farming community, for which majority of the farmers use farm ponds for storing water. The demonstration was carried out three years from 2019 to 2022 at 11 different locations in the district. Primary data was collected through pretested structured interview pertaining to farm ponds and 11 beneficiaries were selected for the demonstration of composite fish farming using farm ponds and through various capacity development programmes and awareness programmes, they were trained in scientific fish farming practices using farm ponds.Based on the scientific knowledge and status of fish farmers the fish farming is implemented (Mishra *et al.* 2007). Pond preparation, water quality management and fish feeding were practically demonstrated. Beneficiaries were provided with critical inputs such as good quality fish seed, fish feed, water testing kits and various other basic components for fish culture. *Pangasius sutchi*, catla, Rohu and Common Carp were stocked at the ration of 5:2:2:1 at the rate of 1 no./m^2. Supplementary feeding and the water samples were collected, analyzed as per the standard procedures APHA (1985). Regular monitoring of the culture and data was recorded was carried out by the KVK scientists. Through these demonstrations adoption of new technologies by the farming community was assessed along with the performance of *Pangasius sutchi* and carps under composite culture in the farm ponds.

3. RESULTS AND DISCUSSION

Farm ponds play a crucial role by storing water for the various agriculture and horticulture farming practices. With intervention of scientific management practices, the same farm ponds can be effectively used for fish culture as well with different beneficial approach. Waste from the fish, mannuring for the primary production and unused fish feed will enrich the water in the farm ponds and it provides nutritious media to the agricultural and horticultural crops. Fish farming using these farm ponds will provide additional income to the farmers along with the effective use of the resources.Composite fish culture has been an age old technology with various combinations of fish species being cultured around the world. The special selection for the same depends on the local demand as well as the performance of the species in the locality. The adoption of technology is totally dependent on the local criteria and community approach (Mandal, 2011). Front line demonstrations are the effective way of disseminating such technologies into the farmer's field by making the farmer to understand the technology thoroughly. The technology dissemination is location specific as the produced product should generate income out of it.

In this demonstration *Pangasius sutchi*along with carps such as Catla, Rohu and Common carp were used composite culture practice.10 months duration of the demonstration per year was conducted in the farm ponds for three years at 11 different locations in the coastal district of Karnataka. Water quality parameters such as pH, hardness dissolved oxygen and turbidity was monitored throughout the demonstration period. Table 1. Depicts the water quality parameters monitored throughout the demonstration period. pH is considered as the productive index of the water body and plays a crucial role in attaining ideal water quality for fish growth. pH didn't exhibited much variation throughout the demonstration period, pH ranged between 6.1 to 7.6 in three years. It is essential to manage the pH concentration in between 6.0 and 8.5 for balancing the productive potential of the water body (Garg *et al,* 2010). Hardness of the water remained under ideal concentrations and with scientific interventions the water quality was monitored ideally. In three years of demonstration, there was no much variation in the hardness concentrations yet maintained under the ideal limits for fish farming. Dissolved oxygen is one of the most important gases for the fishes to survive and perform physiological activities. It varied from 5.3 to 7.4 mg/l in three years and the concentrations were well within the optimal limits for fish culture. Turbidity also remained in the optimal limits with 39-90cm clearance during the demonstration.

Fish growth under the composite fish culture system exhibited a variation between the species. Table 2 and Figure 1. Depict the mean fish growth details in the demonstration during three years. *Pangasius sutchi*under composite fish culture with carps exhibited better growth with a mean growth of 0.948$\pm$0.33, 0.961 $\pm$0.20 and 0.901$\pm$0.16 kg during 2019-20, 2020-21 and 2021-22 respectively. The second year of demonstration exhibited the highest mean growth with 0.961 $\pm$0.20 kg whereas; the farmer practice with

tradition practice exhibited 0.508±0.12 kg mean growth. Catla species exhibited the better growth among all the carps used in the composite culture with anincreasing trend during the three years of demonstration.The growth ranged from 0.902±0.18 to 0.975±0.08 kg during 2019-20 to 2021-22 and under farmers practice, the growth was 0.694±0.14 kg. It is evident that Catla has been the one of the ideal species among carps for composite culture in farm ponds. Rohu was next best species in terms of growth with a mean growth of 0.883±0.11, 0.885±0.05 and 0.859±0.06 kg during 2019-20-2020-21 and 2021-22 respectively. Whereas, under the farmer's practice, 0.468±0.08 kg of growth was reported and this minimal growth has the effect on the total yield. Common carp exhibited a decreasing trend in mean growth during the three years with a variation of 0.642±0.24 to 0.751±0.11 kg while, the farmers practice reported 0.447±0.11 kg.*Pangasius sutchi*and Catla performed better in terms of growth in farm ponds under the composite culture system giving more benefits to the farmer.

Table. 1: Results of water quality parameters range in the demonstration

Parameters(Range)	**2019-20**	**2020-21**	**2021-22**	**Mean variation**
pH	6.1-7.6	6.7-7.3	6.4-7.4	6.1-7.6
Hardness (mg/l)	48-92	59-77	43-89	43-92
Dissolved Oxygen (mg/l)	5.3-7.4	5.3-6.8	6.3-7.1	5.3-7.4
Turbidity (cm)	43-90	39-79	41-86	39-90

Table. 2: Results of mean growth of fish in the demonstration of composite fish culture

Mean Growth (Kg)	***Pangasius sutchi***	***Catla***	***Rohu***	***Common carp***
2019-20	0.948±0.33	0.902±0.18	0.883±0.11	0.751±0.11
2020-21	0.961 ±0.20	0.964±0.20	0.885±0.05	0.651±0.06
2021-22	0.901±0.16	0.975±0.08	0.859±0.06	0.642±0.24
Farmers practice	0.508±0.12	0.694±0.14	0.468±0.08	0.447±0.11

Table. 3: Results of the demonstration of composite fish culture

Production details	***Yield (qtl/ha)***	***Gross cost (Rs)***	***Gross Return (Rs)***	***Net Return (Rs)***	***B:C***
2019-20	72.695	299150	726946	427796	*2.43*
2020-21	68.481	302567	684809	382242	*2.26*
2021-22	71.689	304491	716888	412397	*2.35*
Farmers practice	51.990	270719	457933	187214	*1.69*

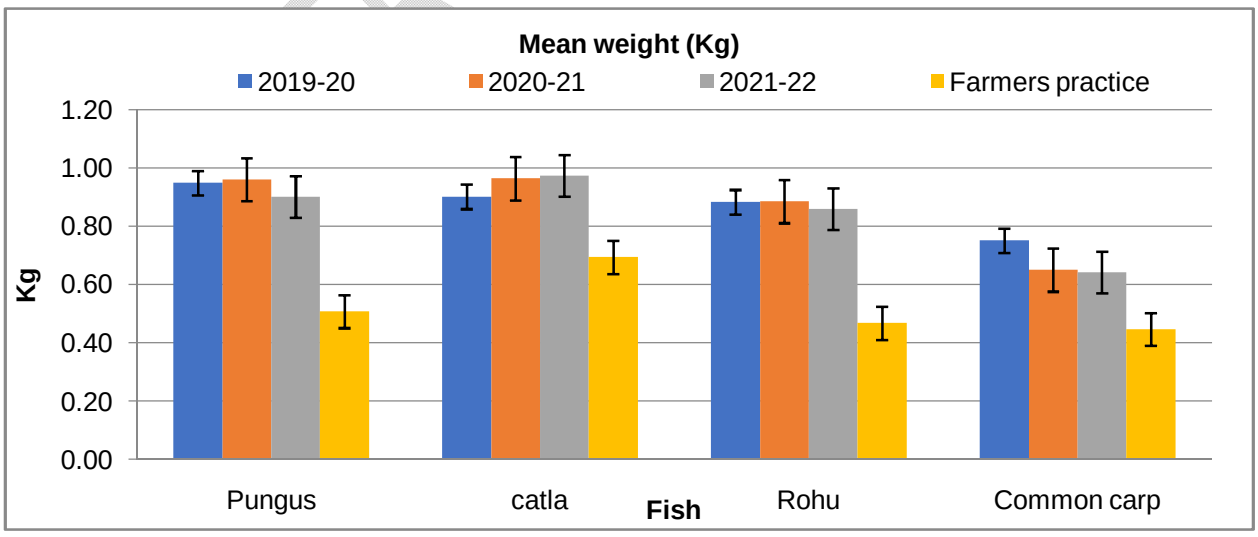

Figure 1: Mean weight of fish in the composite fish culture demonstration

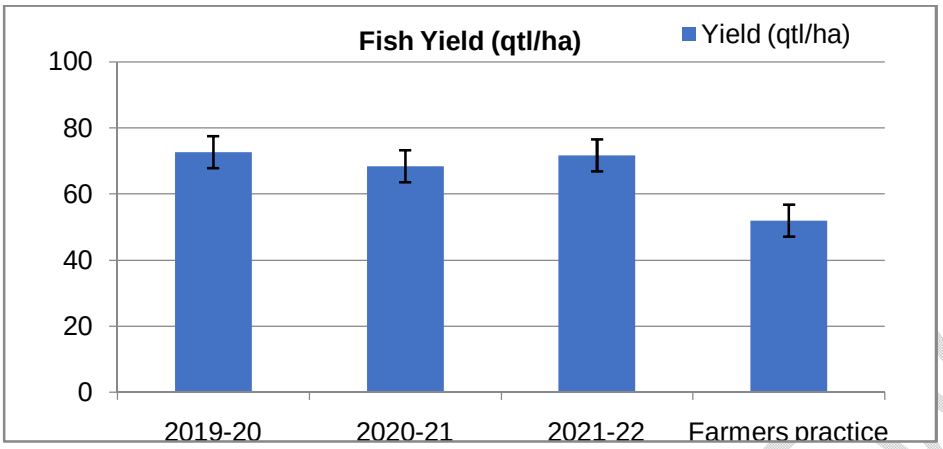

Figure 2. Mean fish yield from the composite fish culture demonstration

4. CONCLUSION

The total yield from the demonstration varied between the demonstrated years with a minimum yield of 68.451 qtl/ ha in 2020-21 and a maximum of 72.695 qtl/ha during 2019-20.Adoption of fisheries technologies in coastal districts of Karnataka is still in a gentle stage (Savita singhal et al 2017) and with more awareness and demonstration such as these will have more impact on the uptake.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

We all author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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