Improving profitability of small scale farming by integrating fish culture into traditional rice farming in Kerala state, India

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Abstract

In Kerala state, India, rice farming has been drastically declining. The increasing cost of cultivation without any commensurate increase in output price is the major factor that have contributed large scale switching to more remunerative crops. In an attempt to remedy the situation, the State Government is promoting rice-fish rotation farming. The programme envisages one crop of paddy followed by another crop of fish during the year. During the initial phase, which is already underway fish like catla, rohu, Chinese carps especially grass carp etc., are being widely grown. Initial results have shown that this culture system is profitable and have found high acceptance among the farmers. In addition to giving financial support to the farmers and local governing bodies to promote the system, the government is also establishing a comprehensive legislation to regulate all aspects of this new farming system. For the project to prosper and be sustainable there is a need for continuous research investments into the various aspects of this new production system in this area. An information sharing partnership with institutions that have experience in managing such systems in other parts of the world could come in handy at this stage.

Keywords: rice-fish rotation farming, profitability, Kerala

Introduction

In the context of the exploding world population and limited availability of land for farming, production strategies that ensure sustainable advances are a plausible alternative to intensive farming. The following article discusses efforts being to increase the profitability of rice farming profitable and attractive to the farmers in Kerala state, India, by rotating it with fish culture.

Decline of rice cultivation; reasons and concerns

Rice cultivation has been traditionally important in Kerala state. It used to occupy 24 per cent of the net cropped area in the state. But, of late paddy farming has started vanishing from the state. In 1970 there were 1 million hectares under paddy in the State. According to the Kerala State Government's latest figures, paddy cultivation has shrunk considerably in the state, with the area under cultivation having fallen to 0.353 million hecatres during 1998-99. The production figure for the year was 0.728 million tonnes. These compare poorly with the acreage of 0.471 million hectares and a production of 0.953 million tonnes only three years ago. At the current rate rice cultivation might totally disappear from Kerala by the year 2015, unless steps are taken to raise its attractiveness to the farmers.

There is however, continued high demand for rice as it is the staple food of the people in Kerala. The current domestic production of less than 0.8 million tonnes of rice is hardly sufficient to meet even a third of the state’s annual requirement. The remaining portion is obtained from other parts of India. Disconcertingly the rice cultivation area in neighbouring states such as Andhra Pradesh and Karnataka have also considerably decreased.

The shrinkage of paddy fields has not been an overnight phenomenon and it has had a considerable impact on the socio-economic texture of Kerala. According to experts the increasing cost of cultivation and disproportionate increase in prices of inputs such as fertiliser, pesticides and labour without any commensurate increase in output price are the major factors that contributed to the persistent pressure for more preference to other more remunerative crops rather than rice. The non-availability of labourers for paddy fields would also be a major constraint in the next 15 years. At present, the average age of labourers involved in rice cultivation is between 40 and 42. The new generation is hesitant to undertake the conventional works in the paddy fields such as threshing and harvesting. The wrong policies imposed on the agricultural sector over the past years had misled the farmers and they were unable to

identify the appropriate technology to sustain their agricultural operations and its profitability. The intervention of political parties and conflicting interests had also led to disunity and the farmers are in total disarray. It has become vital to consider new measures to enhance the productivity of this food crop and ensure the well-being of the farmers.

Integration of aquaculture into the rice farming system

The socio-economic problems resulting from the decline of rice cultivation has been especially relevant to the Kuttanad area in central Kerala, one of the main rice cultivation areas in the state, where the agrarian economy is in a shambles. This ecologically sensitive low lying area situated below sea level with connections to both the fresh water rivers and the sea was earlier known for its high productivity because of the natural energy subsidies available to it.

To ameliorate the living conditions of the farmers, the State Government sponsored ‘Fish Farming Development Agency’ (FFDA) has been set up to implement a project to promote rice-fish integrated farming. In the light of the increasing recognition of aquaculture as an integral part of farming systems in the wetlands, the present project seeks to popularise the technology with the unification of social, economic, and environmental dimensions of integrated farming. Fish culture in rice fields will be undertaken on a collective basis. Since an overwhelming majority of holdings are small, investments and resources are sought to be pooled under this set up. The infrastructural modifications such as strengthening bunds, fixing sluices, operating pumping devices and maintaining common fish nurseries for each Padasekharam (grouped rice farm complex) will be taken up separately. Commercial farming, especially monoculture of prawns, will not be encouraged (For one thing, it is an expensive operation to start, requiring capital costs for land development of around Rs. 3,00,000-5,00,000 per hectare (Rs. =rupees, the Indian currency; DM 1=Rs. 22) and annual operation costs of around Rs. 4,50,000 per hectare. It is also a difficult process requiring high levels of skilled management and is known to have negative environmental consequences). Polyculture of fish and prawns under an extensive

farming regime will be given thrust. Rotational farming of finfish and shellfish has also been proposed to be taken up in 2,000 hectares in the first phase of the programme, extending over five years.

Method of Culture

The outer mud walls of a grouped farm are strengthened after the rice harvest. Water level of up to 2 m is maintained during the fish farming period. An area of about 2 % of the farm is demarcated as the nursery pond. Culture fish seed are reared here and released into the farm when the straw starts decaying after rice harvest. Liming is done to bring the pH of water to around 7. About 650 kg cow dung is applied per hectare of the farm as fertilizer. About 5000 fish seed are introduced per hectare in this culture method. The fish reach a size of 800 to 1000 g at the end of the 7-month culture period. Commonly used fish are catla, rohu, common carp, grass carp and silver carp. The total harvest per hectare ranges from 2000 to 3000 kg per hectare.

Advantages of rice-fish rotation culture

The programme envisaged one crop of paddy followed by another crop of fish in a year. Since the fish utilise the rice straw retained after the harvest of paddy and the fallen grains, the expenses on feeds is considerably reduced. With limited feeding, a fish yield of up to 2.5 tonnes per ha. is being realised under the system. Rearing of fish in rice fields also improve the soil conditions and increase rice yields in the next season by up to 10-15 per cent. Dependence on chemical fertilisers would be considerably reduced for the succeeding rice crop. Fish culture prior to a rice crop is effective in suppressing weeds and the outgo on weeding is substantially saved. The use of herbicides and pesticides could also be eliminated. The weeds should not be removed or destroyed as it is consumed by grass carp fish. The widely grown fish varieties in this region are Catla, rohu, and Chinese carps especially grass carp. The farmers earn Rs. 5,000 to Rs. 6,000 per acre from fish farming. The response from the fish farming community has also been encouraging.

Table 1: Comparison of profitability of the rice-fish culture system (system 2) as compared to the rice monoculture (system 1) in Kuttanad region of Kerala state, India (average figures in Rupees per hectare; DM 1 = Rs. 22). The indirect benefits of fish farming such as environmental protection through reduced pesticide and fertilizer utilisation and employment generation are not factored in the calculations)

	System one (rice only)		System two (rice and fish)	
	Expenses	Income	Expenses	Income
Cost of rice seed	800		800	
Labour charges	14000		13000	
Fertilizer and pesticide expenses	3000		2000	
Sale proceeds of rice		21000		23000
Sale proceeds of straw		1000		nil
Number of crops per year	2 rice crops		One rice and one fish crop	
Cost of fish farming (materials and labour)	nil		40000	
Income from fish farming		nil		50000
Total cost				
Total income	35600	44000	55800	73000
Net profit		8400		17200

The role of the Government in promoting the new system

At present, 1,873 hectares have been brought under integrated farming in upper Kuttanand region. FFDA is giving Rs. 4,000 per ha. as input subsidy to farmers. Last year an amount of Rs. 4.4 million was disbursed as input subsidy and another Rs. 5.8 million to various panchayats towards infrastructure facilities for fish farming. The amount to be disbursed during the current year would come to Rs. 15 million. The Integrated Fisheries Project, a Government of India undertaking, is purchasing fresh water fish from farmers at Rs. 25 per kg irrespective of its size and category. If the farmers dispose of the varieties after sorting, it may fetch higher prices. Fish booths run by unemployed women have been started in important centres to locally market the produce. The

government also intends initiate steps for exporting a portion of the expected bumper crop from the inland farms.

For fish seeds FFDA is now depending on private and the Government hatcheries. They in turn procure the seeds from Andhra Pradesh and Tamil Nadu. So far, 84 lakh fish seeds have been distributed to various padasekharams for integrated rice- fish farming. Non-availability of seeds often hinders the progress of expansion activities of FFDA. FFDA has also been selected as the nodal agency of a new project to bring out value- added products such as fish curry, cutlet and fish fillets.

About 1,900 hectares have been brought under integrated farming in Upper Kuttanad so far. Besides an input subsidy of Rs. 4,000 per ha., the Government has allotted Rs. 10 million for infrastructure development to the local self governing bodies. The Fisheries Department of the Government has taken up research programmes on the local varieties with a view to distributing quality fingerlings. A model farm has been set up at a 29-acre plot to give guidelines to farmers. Effective measures to enhance the living conditions of the traditional inland fish farming community have been taken up. These include housing, sanitation, proper road facilities etc.

For the overall development of the community, the Government would also introduce a Unified Inland Fishing Bill which envisages among other things, financial assistance to those who become disabled and the family of those who die while on duty. The various schemes under the programme aim at creating more job opportunities for inland fishermen in addition to enhancing the fish production in the State. The Government is also in the process of putting in place legislation to regulate all aspects of the new experimental farming system that has the potential to spread over to large areas. The apprehensions of farmers and the farm labour regarding the farming system which integrated paddy and fish culture are sought to be dispelled. The government has already made it clear that none would be permitted to undertake fish culture alone in paddy fields. It is also being studied how a portion of the profit obtained from fish

culture could be given to the farm labourers, so that the stated objective of an improvement in the socio-economic status of the people living in the countryside in Kerala.

Future perspectives and scientific support

Though this rotational agriculture technology has been recognised as a potentially beneficial and sustainable farming practice, it remains an open field for multi-disciplinary research and verification. One glaring omission in the project seems to be the absence of any provision for the supplementary feed requirements of the fish. As the project spreads to more areas, as it is intended to, the need for providing some supplemented feed to the fish will arise. It might therefore be useful to look at how an adequate supplementary feed can be developed using locally available resources, preferably agricultural by-products. Development of this industry will generate employment and lead to better resource utilisation. As the project expands there might also be requirement for increased local development of fish seed. Another problem is the low survival of the fish of only 30 to 35 % in the farms as against the 50 to 60 % obtained in some model farms. There is considerable scope for improving the productivity of fish farming by increasing the survival rate and productivity.

The scientific input for the project has come from the Kerala Agricultural University. For the project to prosper and be sustainable there is a need for continuous research investments into the various aspects of this new production system in this area. Information needs to be accumulated and developed regarding the most ideal fish species that could be used, the entire nutrient cycling pattern in the fields, the amount and type of feeds that might be required for the fish culture part, and support for the continuous improvement of the system. An information sharing partnership with institutions that have experience in managing such systems in other parts of the world could come in handy at this stage.