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Diversification in agriculture through fisheries based integrated farming system for doubling farmers income in agency areas of West Godavari district of Andhra Pradesh- A case study

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Abstract

Diversification is one of the paradigms shifts in the agriculture. Since monocropping produces high risk with low quantity, single digit income and also sometimes uncertain income are the problems. To address this issue, Krishi Vigyan Kendra, Venkataramannagudem has intervened in the farm activities and developed diversified farm to utilise the available resources and also to generate more income from the farm. Paddy, fish pond, maize, chilli, fodder grass, dairy, poultry are the enterprises, being taken up in 5 acres of the farm to sustain the livelihood. It has been evident that the diversification in agriculture results in increasing farm productivity within the available area under cultivation and also by reducing the human resources.

Keywords: Diversification in agriculture, agriculture cum fisheries, agriculture cum animal husbandry, horticulture cum fisheries

Introduction

India is an agricultural country and most of the Indian families depend on agriculture as occupation. Agriculture plays a vital role in the socio-economic development of rural communities in India and occupies major share in the gross domestic product (GDP). However, the agricultural sector in India is extremely important in spite of its declining share in GDP during the recent years due to the industrialization, which has raised the services sector shares in GDP. Therefore, there is an urgent need for a paradigm shift in the government's agricultural policy to address the problems faced in the agricultural sector in the new domestic and global economic environment and the avenues to enhance the income of the farmers. Diversification is the possible solution for the agro industry.

Diversification is probably one of the most commonly used terms during the recent decade in relation to agricultural development. Agricultural diversification involves a shift of resources from low value commodity mix to high value commodity mix. It focuses mainly on horticulture, dairy, poultry and fisheries sector. The varying nature of risks and expected net returns from each crop/livestock activity, and adjusting in such a way that it leads to minimum generation of income. Conventionally, this diversification was used more in the context of a maintenance kind of farming, wherein farmers grew many crops on their farm. But in the recent decade, diversification is progressively being used to describe increase the area under

high value crops. In addition to these, value added crops is one of the major important strategies that will also lead to better crop planning and improves the earning opportunities to the farming community. Hence, crop diversification comes into picture for economic returns of value-added crops, where in maximum utilization of land and human resources to accelerate the growth of agriculture sector. This crop diversification also increases the total crop productivity in terms of quality, quantity and economic value under specific, diverse agro-climatic situations all over the world.

There are numerous ways for adopting the farming systems to the existing rice, wheat cropping systems available in India. Horticulture opens a new window in this direction with vegetable farming, floriculture, fruit cultivation, mushroom farming, Medicinal and aromatic plants cultivation. Apiary also provides ample scope for diversification and also for maximum utilization of human resources, improving productivity and environmental protection. Apart from this, fisheries based systems like fish pond, horticulture/agriculture crop, dairying, poultry, goatery, piggery, and duckery improves the farm income, besides improves the employment opportunities. The present study focuses on integrated farming system, with fisheries as one of the components which results in the doubling of farmers income.

Farm & Fish Pond Location Farm Design and Model

The present study was conducted in the field of the beneficiary farmer Mr. Madakam Veeraswamy, resident of Yarraigudem Village, Buttaigudem Mandal, West Godavari District, Andhra Pradesh, India. The farm is located in the

latitude of 17.181267 and longitude of 81.430622 of GPS coordinates and the Krishi Vigyan Kendra, Venkataramannagudem has intervened in the farm activities and developed diversified farm. Maize, paddy, fodder grass, pulses, chilli and fish pond are being cultivated in 5 acres. Buffaloes, cows, poultry birds are also being reared. About 6000 fish fingerlings of Catla, Rohu, Mrigal and Grass carp ranging from 50 to 100 g size were stocked in the fish pond. Cattle Dung was applied to manure the pond. Commercially available floating pellet fish feed was applied in the initial days and then shifted to sinking pellet feed. On the pond dykes different horticulture crops like tomato, okra, gourds etc. were cultivated throughout the year

Results and Discussion

Paddy and maize were grown in 4 acres of his main field in one season only i.e. during kharif season. Since during other season, i.e. rabi the water scarcity is more, the yield of paddy was 3 tonnes/2 acre. Whereas the maize yield was 3.75 tonnes/2 acres. Half of the paddy produced was used for domestic consumption, some of the quantity was kept as seed for next season sowing the excess was sold in the market. But the maize was completely sold in the market. The income generated through field crops was around Rs 1,40,000/- in that season (Fig. 1). The stalks and husk from field crops are used as fodder for the milch animals. During the rabi season, pulses were grown in another 2.5 acres and fodder in 1 acre and Chilli was grown in 0.5 acres which yielded 560 kgs which resulted in the net income of Rs, 45,000/- during Rabi.

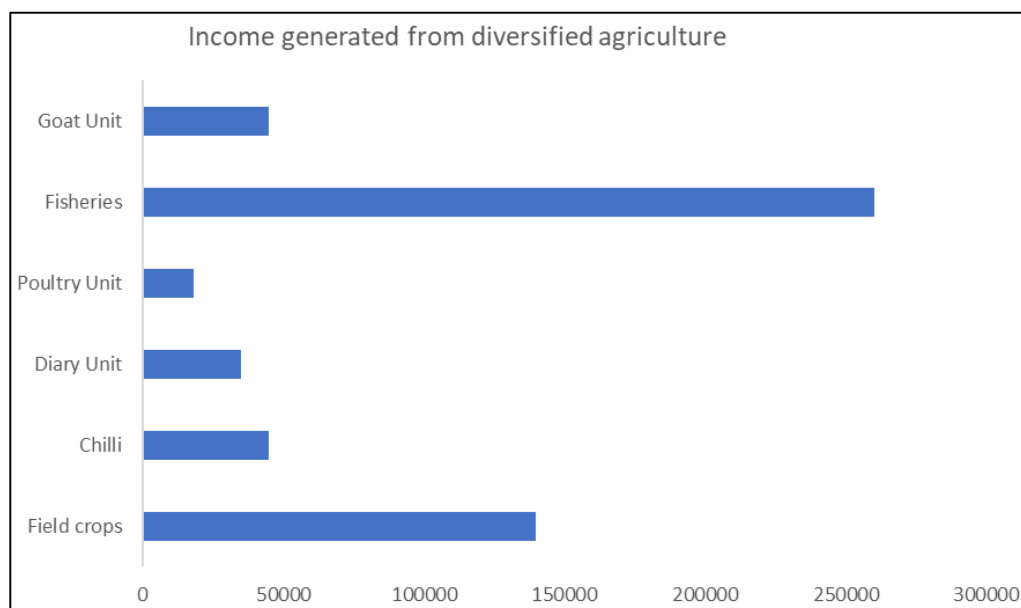


Fig 1: Income generated from diversified agriculture sectors

A dairy unit with 4 (2+2 calf) murrah buffaloes and 8 (6+2 calf) cows was maintained in the shed to serve the dual purpose of milk production and supplying manure for fish pond and crops. The animals were fed with byproducts from paddy, maize etc. Extensive rearing of buffaloes with loose house grazing was also done till sunset. The Murrah buffaloes produced 19 litres of milk per day per 2 animals. Since, two animals are in milking stage and the milk was sold at Rs. 40/- per litre. Three cows yielded around of 8 litres milk which was sold at Rs. 25/litre. It is observed that higher net income was realized under dairy-based mixed farming and 174 mandays of additional employment was generated over mono

cropping (FAO 1992; FAO 2001; Patel and Dutta 2004) [5, 7, 16]. A poultry unit was set up with 60 number of Aseel and Vanaraja birds and even their droppings are collected and used as manure in the fish pond as it is an excellent feed for fish as it contains highly soluble organic salts, more N and P as compared to other livestock manure. Eggs were used for multiplication of birds but not for selling. The poultry birds were also sold for Rs. 250/kg of live weight. This unit generated an additional income of Rs. 15,000 to 20,000/- per annum by selling 30-40 poultry birds. Integration of a remunerative enterprise like dairy with conventional enterprise like crop husbandry can greatly enhance the net

income obtained from the limited land area and thus improves the standard of living of farmers (FAO 1997) ^[6]. These results are in accordance with Rangaswamy *et al.*, (1995) ^[12] studied an integrated farming system with cropping, dairy, spawn production, biogas and silvi-pasture as components and obtained remarkably higher additional net income. Cattle-fish integrated system is very common in rural India. People generally mix cow dung with paddy husk and spread over water bodies as a ready source of fish food (Chakrabati *et al.*, 2014) ^[3].

Composite fish culture involving surface feeder (catla), column feeder (rohu and grass carp), and bottom feeder (mrigal and common carp) with a ratio of 3:4:3, respectively was adapted in the fish pond. Initially the stocking density was 5000 nos. The natural food i.e. plankton (phyto and zoo) borne out of continuous fertilization due to poultry droppings, and cattle manuring was sufficient for the fish to feed upon. In addition to this, pelleted feed was also fed and the fish was reared till it attains table size, weighing more than 700 – 1000 g. Partial harvesting was done after 8 months and based on the demand of the fish, the periodical harvesting was taken up using cast net. The maximum growth was observed in catla, followed by rohu, mrigal, and common carp. The maximum size of catla was attained at final harvest at around 2.5 kgs. This may be due to the consumption of plankton and feed. Harvested fish of 2600 kgs/ acre was sold at Rs. 100/kg and generated a net income of Rs. 95,000/-. These results are in accordance with the earlier findings of Reddy *et al.* (2017) ^[14]; Chakrabati *et al.* (2014) ^[3]. Edwards (1997) ^[4] and Jitsanguan (2001) ^[9] who defined the IFS as an aquaculture system that is integrated with livestock in which fresh animal waste is used to feed fish and also reported that there are synergies and complementarity between enterprises that comprises a crop and animal component which form the basis of the concept of IFS. According to this concept, integration usually occurs when outputs (usually by-products) of one enterprise are used as inputs by another within the context of the farming system (Khan *et al.*, 2015) ^[10]. Bahire *et al.* (2010) ^[2] defined the IFS as an integrated mixed farming system, the practice of raising different yet dependent enterprises and are primarily complementary and supplementary to each other. From the study, it has been evident that the Integrated Farming System (IFS) focuses on increasing farm productivity by increasing diversification, resource integration and creating market linkages.

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Conflicts of Interests

The authors declare no conflicts of interest.

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