CONTEMPORARY RESEARCH IN INDIA
ISSN 2231 - 2137

ROLE OF INTEGRATED FARMING SYSTEM IN AGRICULTURE DEVELOPMENT

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Received: 09/05/2018	Edited: 18/05/2018	Accepted: 26/05/2018

Abstract: *In the present scenario it has became a challenge to feed the ever increasing population of India. The Indian agriculture is dominated by small and marginal farmers having low investment capacity. Integrated Farming System (IFS) plays an imperial role for maximising profit and production to meet nutritional requirement with food security with less investment. Integrated farming system is farming system which consists of at least two separate but logically interdependent farm enterprises. Integration in IFS occurs when output of one enterprise is used as an input in another enterprise. FAO sates there are no waste and waste is only a misplaced resource which becomes a valuable material for another product in IFS. IFS is gaining more attention due to deteriorating resource base, low rate of farm resource recycling, narrowed biodiversity, employment generation, climate change and sustainability issues. IFS can be one of the strategy for doubling the farmers' income as the farmer can get income from different enterprises round the year. The constraints faced by farmers in adoption of IFS include shortage of labour, Lack of availability of critical inputs like seeds etc at proper time, low investment capacity due to small size of land holdings and lack of awareness about benefits of integrated Farming System.*

Key Words: *Integrated Farming System, Farm enterprises, Recycling, Sustainability.*

Introduction

In the present scenario, it is hardly difficult to meet out the ever increasing requirement for the ever rising population in India. Unfortunately, In India the food producing enterprises like agriculture and its allied activities namely livestock farming, horticulture, floriculture, aquaculture etc. have been dominated by the small and marginal farmers. The average monthly income of an Indian agricultural household, according to NSSO 70th round, is estimated to be RS. 6426/- at national level, which is at least four times lesser than the lowest paid central government servant with salary of RS.18,000/- per month (minimum pay according to 7th pay commission recommendations). Thus a newly joined teacher with RS.850/- per month salary in 1980 would now withdraw Rs. 96,700/- and Rs. 46,000/- will be his monthly pension on retirement .On the contrary, an average marginal farmer would have to earn at least Rs. 140,000/- per acre just to match the basic minimum wage (Jakhar,2015). Small and marginal farmers are unable to invest more capital for doing intensive farming activities to produce more and meet the requirement. Shrinking average farm size in India and financial constraints for higher investment in agriculture due to 80% farm families belonging to small and marginal farmer categories heighten the challenge. For securing food and nutrition security for sizable population, productivity enhancement may provide a vital solution. In this situation, Integrated Farming System (IFS) plays an imperial role for maximizing their profit and production to meet the nutritional requirement with food security with less investment. Further in IFS it is more advantageous that the farmers can able to produce more by using optimal resource utilization and recycling of waste materials and family labour employment. FAO (1977) stated that "there is no waste", and "waste is only a misplaced resource which can become a valuable material for another product" in 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. IFS ensure that wastes from one form of agriculture become a resource for another form. Since it utilizes wastes as resources, we not only eliminate wastes but

we also ensure overall increase in productivity for the whole agricultural systems.

Review of Literature

Okigbo (1995) defines IFS as a mixed farming system that consists of at least two separate but logically interdependent parts of a crop and livestock enterprises.

Jitsanguan (2001) defined the IFS as an aquaculture system that is integrated with livestock and in which fresh animal waste is used to feed fish and also reported that there are synergies and complementarity between enterprises that comprise a crop and animal component that 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.

Jayanthi et al. (2000) described that the integrated farming systems as a mixed crop-animal system where the animal component is often raised on agricultural waste products while the animal is used to cultivate the soil and provide manure to be used as fertilizer and fuel.

Radhammani *et al.* (2003) described IFS's as a component of farming systems which takes into account the concepts of minimizing risk, increasing production and profits whilst improving the utilization of organic wastes and crop residues. It is clear from the above that there are synergies and complementarily between enterprise that comprise a crop and animal component that form the basis of the concept of IFS.

Mangala (2008) revealed that the integrated farming practices adopted by respondents after implementation of Integrated Farming System Programme in Dharwad were agriculture-horticulture-forestry-dairy vermicompost (62.14%), agriculture-horticulture-forestry-dairy-vermicompost-forage crops (21.43%), agriculture-horticulture-dairy-forage crops (7.86%), agriculture-horticulture-forestry-dairy-forage crops (5.00%) and agriculture-horticulture-dairy (3.57%).

Mahapatra and Bapat (1992) viewed the farming system as a complex interrelated matrix of soil, plants, animals, implements, power, labour, capital and other inputs controlled in part by farm families and influenced to varying degrees by political, economic, institutional and social forces that operate at many levels.

Balakrishnan (1994) stated that integrated farming system approach introduces a change in the farming techniques for maximum production in the cropping pattern and takes care of optimal utilisation of resources.

The relevant literatures which were related to IFS were reviewed and following objectives of the paper are framed.

Objectives

1) Need and benefits of Integrated Farming System.
2) Integrated Farming System as one of the Strategy for doubling the farmers income.
3) Constraints faced by farmers in adoption of Integrated Farming System.

Need of Integrated Farming System

Deteriorating resource Base: During post-green revolution period, our attempt to solve food problem and attain self-sufficiency in food production through excess use of agrochemicals, inevitable dependence on irrigation and high cropping intensity has led to contamination of food with harmful chemicals, pollution of ground water, degradation of soil quality and damage to agriculturally beneficial microorganisms.

Low Rate of Farm Resource Recycling: In the absence of adequate knowledge among farmers about techniques and benefits of recycling of farm, industrial and municipal organic wastes in agriculture, these remain unutilized. A vast untapped potential exists to recycle these solid and liquid organic wastes of farm origin.

According to study of Das and Singh (1992) Continuous dairy based farming system increased the organic, humic and fulvic carbon and available N, extractable K, Ca and Mg, Zn, Mn, Fe with time. Rangasamy (1994) opined that integration of enterprises like cattle rearing, fishery, poultry and goat rearing, sericulture and mushroom cultivation with cropping could properly recycle the residues for

getting maximum compatibility and replenishment of organic matter.

Narrowed Biodiversity: The narrowing of genetic biodiversity occurs as traditional crop varieties and local animal breeds are being replaced by modern ones. These new varieties/ breeds are certainly better matched to modern intensive agriculture, but rarely any consideration is given to preserving the bio-diversity of an agricultural ecosystem. In addition, the increased farming density tends to erode the biodiversity of flora and fauna in the agricultural ecosystems. For example, extensive adoption of rice-wheat monoculture in the Indo- Gangetic Plains has replaced the other traditional crops. Soil micro-flora is also adversely influenced on account of large-scale use of agro-chemicals and lack of recycling of crop residues in the region.

Employment Generation: According to Shalendar kumara et al.(2010) Goat rearing, which is one of the most widely adopted livestock activities in the country, has the potential to emerge as a very good source of income and employment for the rural people especially in the less favoured environments. According to Deoghare (1997) the average labour employment per household per year from goat, sheep, buffalo and crop farming were 23.3, 1.9,33.1 and 41.5 per cent respectively in Uttar Pradesh. According to Singh, H and S.S..

Climate Change: The increasing green-house gases resulted in global warming. The Intergovernmental Panel for Climate Change (IPCC) projections on temperature predicts an increase of 1.8 to 4.0 °C by the end of this century. Temperature and sea level changes will affect agriculture through their direct and indirect effects on crops, soils, livestock, fisheries and pests. The brunt of environmental changes is expected to be very high in India due to greater dependence on agriculture, limited natural resources, alarming increase in human and livestock population, changing pattern in land use and socio-economic factors that pose a great threat in meeting the food, fiber, fuel and fodder requirement. Recent studies done at the Indian Agricultural Research Institute indicated the possibility of loss of 4-5 million tonnes in wheat production in future with every rise of 1°C temperature throughout the growing period.

Benefits of Integrated Farming System

Solving fuel and timber crisis: Surinder. S.R. (2013) sates linking agroforestry appropriately the production level of fuel and industrial wood can be enhanced without determining effect on crop. This will also greatly reduce deforestation, preserving our natural ecosystem.

Productivity and profitability:

IFS provides an opportunity to increase economic yield per unit area per unit time by virtue of intensification of crop and allied enterprises. Use waste material of one enterprise at the least cost as input for other enterprise. Thus, reduction in cost of production, form the utilization linkage of waste material and elimination of middleman interference in most input used.

Agro–industries: When one of produce linked in IFS are increased to commercial level there is surplus value addition leading to development of allied agro–industries.

Sustainable Rural Livelihood Security through IFS: Lightfoot and Minnick (1991) reported that the integration of trees into these systems offered income security and ecological protection. Added to this, the use of diverse plants and animals broadened possible sources of income generation.

Adoption of New Technology: Resourceful farmers (big farmer) fully utilize technology. IFS farmers, linkage of dairy/mushroom/sericulture/ vegetable. Money flow round the year gives an inducement to the small/original farmers to go for the adoption of technologies.

Saving Energy: To identify an alternative source to reduce our dependence on fossil energy source within short time. Effective recycling technique the organic wastes available in the system can be utilized to generate biogas. Energy crisis can be postponed to the later period.

Meeting Fodder crisis: Every piece of land area is effectively utilized. Plantation of perennial legume fodder trees on field borders and also fixing the

atmospheric nitrogen. These practices will greatly relieve the problem of non – availability of quality fodder to the animal component linked.

Integrated Farming System as one of the approach for doubling the Farmers' income

In India, the farmers maintain different enterprises for their complimentary and supplementary nature and for ensuring sustainable livelihood from time immemorial. After the advent of green revolution in late-1960s and economic liberalization in early-1990s, the farmers gradually started focusing on a few enterprises due to several imposing factors including shrinking farm sizes, fluctuating commodity prices, livelihood diversification and shortage of labour during peak agriculture season. It had a severe impact on food and nutritional security of millions of poor farm households. The Government of India has made an announcement about Doubling Farmers' Income by 2022. Experts are judging the options and strategies for achieving this enviable target. One of the options is to evaluate the potential of age-old integrated farming system (IFS) in enhancing income of farm families within the reasonable time period. Integrated farming system provides income to the farmer during slack seasons also from other enterprises like dairy, poultry etc. K. Ponnusamy and M. Kousalya Devi (2017) revealed during a study in Tamil Nadu that when farmers grew only paddy, they got a net benefit of `40755/ha by spending `45942/ha. The study revealed incremental net benefit of adopting different enterprise combinations with improved management practices increased by `Rs. 7880 for crop + dairy, `12680 for crop+ dairy+ poultry, ` 57530 for crop + dairy + poultry + fishery and ` 35840 for crop + dairy +poultry + sheep/goat. Farmers can apply the total manure from dairy, backyard poultry and small ruminants (sheep and goat) and the soil gets enriched as one ha farm normally requires 12500 kg of farm yard manure every year.

A. P. Srivastava (2018) revealed that Integrated rice-fish farming model followed by vegetable crops, utilizing the residual moisture and nutrients added by activities of fish, was promoted in a total area of 160 ha in Lakhimpur, Kokrajhar and Karbi Anglong districts. After harvesting rice crop, vegetables (french bean, chilli and knolkhol) were cultivated in the field. Net economic benefit per household per annum from this intervention was 29,000.00. Rice production increased from 2.97 tonne/ha (baseline value) to 4.6 tonne/ha. Besides, beneficiary farmers got an average of 41 kg fish and 1.7 tonnes vegetable from 2,800 m^2 rice fields.

Constraints in Adoption of Integrated Farming System

Shortage of labour: The unavailability of labour becomes a constraint in adoption of Integrated Farming Systems by farmers. Lightfoot (1997) suggested that the main constraints to adoption of integrated farming systems in the Philippines and Ghana were the long transition period that often occurs when implementing an integrated production system, labour shortages, especially where the family size is small, which effectively prevented them from adopting integrated farming techniques.

Lack of availability of critical inputs: According to K**.** Ponnusamy and M. Kousalya Devi (2017) the main constraints faced by farmers in adoption of Integrated Farming Systems are labour unavailability and its high cost, lack of infrastructure facility and non-availability of improved varieties of seed /breeds at farm site. According to J. Pushpa (2010) the main constraints in adoption of Integrated Farming Systems are Inadequate credit facilities and Inadequate supply and high cost of labour. Nageswaran et al. (2009) reported that the shortcomings perceived by the Integrated Farming System (IFS) farmers were support for procuring improved breeds of livestock would help in enhancing dairy related activities and add to the income of the farm, timely availability of fish seed and fish feed.

Small Size of Land holdings: The shrinkage in farm size and 80 percent of the farm families belonging to small and marginal farmers also becomes a constraint for adoption of Integrated Farming Systems. According to K**.** Ponnusamy and

M. Kousalya Devi (2017) the scattered land holdings becomes a constraint for adoption of IFS.

Lack of awareness about benefits of IFS:- Farmers are unaware about what benefits can be sought out of adoption of IFS. According to J. Pushpa (2010) the main constraints in adoption of Integrated Farming Systems are lack of co-ordinated extension service, Lack of demonstration on integrated farming system, Lack of knowledge on integration aspects of sub systems.

Low market Prices of produce: According to J. Pushpa (2010) the low prices of the final produce discourages the farmers to go for diversification. According to Hari singh etal. (2016) the main constraint faced by farmers in livestock enterprises in Integrated Farming System is Low price of cross bred cow milk.

Low availability of fodder: According to Hari singh etal. (2016), non-availability of green fodder cultivation, low availability of dry fodder are the main constraints faced by farmers in adoption of livestock enterprises in Integrated Farming System. Ngambeki *et al.* (1992) revealed that the lack of animal feed throughout the year and unavailability of labour in needy times are the major production constraints in IFS.

Heavy investment in the initial Stage:- The adoption of IFS requires the more investment in initial stage. Banerjee *et al.* (1990) revealed that the limited amount of capital as the main constraint in IFS. Thamrongwarangkul (2001) reported that resource-poor farmers are not able to invest more capital as initial investment as a constraint since there is need of immediate economic returns to meet their food requirements, schools, medical treatments and loan- repayment. According to K**.** Ponnusamy and M. Kousalya Devi (2017) the main constraint faced by farmers in adoption of Integrated Farming Systems is heavy investment in the initial stage of starting.

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