Indian Journal of Extension Education
Vol. 55, No. 2, 2019 (95-100)

Status and Scope of Integrated Farming System (IFS) in Upper Brahmaputra Valley Zone of Assam

Debahash Buragohain[1], Sajib Borua[2] and Utpal Barman[3]

ABSTRACT

Integrated Farming System is a mixed or multiple farming practices comprising agriculture, fishery, animals and other farming practices having a synergistic relation with each other to achieve the maximum output. A study was conducted in three districts of Upper Brahmaputra Valley zone of Assam viz. Tinsukia, Jorhat and Golaghat and identifying various components of IFS and their synergistic relation between various components. The study was carried out for 120 respondents with 40 respondents from each district. During the study, 13 different IFS models were identified with rice as one of the main component. The most widely used IFS model is Paddy+Vegetable+Dairy+Fishery. Categorization of farmers based on personal, socio-economic and psychological characteristics of the farmers was done along with the association between this characteristics and adoption to any of the model of IFS. Economic motivation and source of finance is significantly associated with adoption of IFS whereas age, education, land holdings, annual income, source of income, extension contact, training exposure, information source utilization, scientific orientation, risk preference and decision making ability are not significantly associated. Various constraints like social problems, disease and pest, financial, knowledge and skill were identified during the study. The findings will help in redesigning the already implemented schemes to ensure a higher adoption of IFS in the region and doubling farmer's income by 2022.

Key words: Synergistic relation, models of integrated farming, constraints of integrated farming

INTRODUCTION

The increase in population, more and more farmers are turning small and marginal, shifting their occupation to other non-agricultural sectors. Moreover, the farmers are unable to use advanced technology in farming either due to less land or due to fragmentation of land. Integrated Farming System (IFS) helps the farmers to meet his domestic requirement and provide an employment opportunity for his family member round the year, besides being a source of income generation.The primary biological feature of an integrated farming system is by-product recycling and improved space utilisation, in which two subsystems occupy part or all of the space required for one subsystem, may be an essential aspect of increased productivity. Integrated farming systems also reduce the risks associated with farming because of the increased diversity of produce.There is a synergism in integrated farming since the working together of the subsystems has a greater total effect than the sum of their individual effects. An IFS has a vast scope in improving the productivity and profitability of farms and also reducing the maximum utilisation of off-farm inputs by way of efficient recycling of on-farm resources. Several types of research have been taken up by various scientists on IFS in different parts of the country and outside to analyse its effects on productivity, profitability, nutrient management and employment generation. Okigbo (1995) defined these systems as a mixed farming system that consists of at least two separate but logically interdependent parts of a crop and livestock enterprises. Radhammani et al. (2003) describes IFS's as a component of farming systems which minimize risk, increase production and profits and improving the utilisation of organic wastes and crop residues. Jayanthi et al. (2000) based on experiences from Tamil Nadu, India, described these systems as a mixed animal crop system, where the animal component is often raised on agricultural waste products while the animal is used to cultivate the soil and

[1.] Senior Research Fellow, NICRA, Indian Agriculture Research Institute-ICAR, [2.] Assistant Professor, Department of Extension Education, AAU, Jorhat and [3.] Professor, Department of Extension Education, AAU, Jorhat

provide manure to be used as fertiliser and fuel.

Assam is mainly an agricultural state, with 80 per cent of the working population were, directly and indirectly, engaged in agriculture. The primary sector alone contributes around 80 per cent of state domestic product. Bhowmick *et al.* (1999) in his study observed that average operational land holdings in Assam is 1.31 ha, and over 60 per cent of the total operational land holdings in the state are marginal holding i.e., land area of less than 1 ha and 23 per cent are small, *i.e.,* 1 to 2 ha, 14 per cent holdings between 2 to 3 ha are medium and only 3 per cent are large, *i.e.,* above 3 *ha.* So sustainability of the weaker section of the society mainly the small and marginal farmers largely depend on the success of agriculture which can be achieved by efficient utilisation of the existence scarce resources.

METHODOLOGY

The study was conducted in three districts of Upper Brahmaputra valley zone namely Tinsukia, Jorhat and Golaghat district. The reason behind selecting the districts was high prevalence of farming system and existence of different agro-ecological situations in these districts. Each block and village was randomly selected by consultation with respective District Agriculture Office from each district *viz.* Margherita Block (Tinsukia), Titabor Block (Jorhat) and Gomariguri Block (Golaghat). From each block, two Agriculture Development Offices (ADO) circle were selected randomly, *i.e.,* Makumtila and Ketetong from Margherita block, Borhula and Madhavpur from Titabor block, Jamuguri and Merapani from Gomariguri block. Two villages were selected from each ADO circle followed by ten respondents from each village randomly. So a total of 120 respondents were selected for the studies. Descriptive statistics were used to identify the respondents and constraints of IFS among farmers. Chi-square was used to study the association between independent variables and dependent variables. A semi-structured interview schedule/questionnaire was prepared to collect information from the farmers.

RESULTS AND DISCUSSION

Identification of various combinations of farming system

From the study, thirteen (13) different combinations of the farming systems were identified in the study area. The identified combinations of farming systems were presented in Table 1. Out of this Paddy + Vegetables + Dairy + Fishery was mostly practised by the respondent farmers consisting of 15 per cent of the total respondents and Paddy+Vegetable+Dairy+Goatery was least practised by the farmers consisting of only 4.16 per cent of the total respondents. It was observed that in all the combinations of farming systems, paddy is one of the main components, being the staple food, which shows that most of the combinations of the farming systems were paddy-based.

The details of other combinations of farming systems were given below in Table 1.

Table 1: Distribution of different combination of farming system

	Frequency	Percentage (%)	Rank
Paddy+Vegetables+Dairy+Fishery	18	15	1st
Paddy+Vegetable+Piggery+Duckery+Fishery	14	11.67	2nd
Paddy+Vegetable+Piggery+Duckery	11	9.17	3rd
Paddy+ Piggery+Duckery+Fishery+Goatery	11	9.17	3rd
Paddy+Vegetables+Dairy+Fishery+Poultry	11	9.17	3rd
Paddy+Goatery+Piggery+Fishery	9	7.50	4th
Paddy+Dairy+Piggery+Duckery	8	6.67	5th
Paddy+Vegetable+Dairy+Poultry	8	6.67	5th
Paddy+Piggery+Poultry+Fishery	7	5.83	6th
Paddy+Piggery+Fishery	6	5	7th
Paddy+Vegetable+Piggery+Goatery	6	5	7th
Paddy+Goatery+Duckery+Poultry	6	5	7th
Paddy+Vegetable+Dairy+Goatery	5	4.16	8th

Distribution of various components of Farming System

It was observed that 100 per cent of the respondents practised paddy as one of the components of IFS (Table 2). Paddy is one of the most important crops grown in Assam, being the staple food crop of the majority of the people. Soni *et al.* (2014) has observed that rice based IFS comprising of crop components, dairy, poultry and fishery was the most suitable and efficient farming system model giving highest productivity and ensured the multiple uses of water.It was followed by fishery which was practised by 63.33 per cent of the respondents. It may be due to abundant water bodies available in the areas and becausevarious fishery development schemes have been initiated by the State Government in the study areas. Vegetables were grown by 60.83 per cent of the respondents, which also include the vegetables grown in their kitchen gardens. Piggery was one of the essential components of IFS consisting of 60 per cent of the respondents. It was found to be relatively profitable amongst the various components of farming systems. Although some social restrictions were also observed in following this agro-based enterprise, the market demand for pork (pig meat) is seen to be increasing gradually. Dairy farming was practised by 46.67 per cent of the respondents. Duck farming was practised by 36.67 per

cent of the respondents as it was also relatively economical as low investment was needed in this enterprise and it involved the less intensive care of the birds and therefore less labour. Goatery and Poultry were practised by 30.83 per cent and 26.67 per cent of the respondents, respectively (Table 2). The reasons behind the low practice of this farming may be due to risks of higher susceptibility to diseases and threat of subsequent mortality.

Table 2: Frequency distribution of various components of farming system

Farming system	Cumulative Frequency	Percentage (%)	Rank
Paddy	120	100	1st
Fishery	76	63.33	2nd
Vegetables	73	60.83	3rd
Piggery	72	60.00	4th
Dairy	56	46.67	5th
Duckery	44	36.67	6th
Goatery	37	30.83	7th
Poultry	32	26.67	8th

Socio-personal and socio-economical characteristic of the farmers

It is observed that majority of the respondents belonged to middle age group (58.33%) followed by young age group (25.83%). A few old aged people (15.83%) were also engaged in IFS. The finding is similar to Preumathiyalangaan *et al.* (1998) and Puthirapatra *et al.* (1999). More involvement of middle aged people in IFS may be due to unemployment that is prevailing since long time. Young people up to the age group of 35 years were less involved in farming as most of them migrated to cities for employment. Old age people are mostly involved in their traditional way of farming and might be less motivated to adopt the option of integrated farming. It is observed that majority of the respondents were higher secondary passed (36.67%) followed by HSLC (30.83%), middle school passed (20.83%) and graduate (10%). A very few people were primary school passed (1.67%) and no respondents were found who were illiterate. The reason behind high level of respondents, *i.e.,* 98.33 per cent possessing at least middle school passed is that most of the respondents are belonging to middle age group and young who were educated being aware of the value of education. Although they are unemployed, they seemed to know the importance of formal education and therefore acquired it. Also there is availability of middle level educational institutions in the area from where they got their education. The finding is in consistence with Sharma (1994). It was also observed that majority of the respondents, on the basis of size of land holding owned were belonging to the category of medium farmers (36.67%) followed by small farmers (28.33%) with few belonging to the category of big farmers (27.50%). Only 7.5 per cent of the respondents were marginal farmers. Same finding was observed by Saravankumar (1996), Nagaraja (2002) and Prasad (2003).The situation in which they live may be attributing to the fact that most of the respondents possess large area of cultivable fallow land. It was revealed that majority of the respondents (41.67%) belong to medium income category followed by high income category (38.33%) and low income category (20.00 %). This may be due to fact that almost 40 per cent of the respondents possessed job or business as another source of income.

The finding is similar to Suresh (2004) and Sagamesh (2006). The source of income of majority of the respondents (59.17%) was from farming only while 40.83 per cent respondents had both farm and non-farm activities as their sources of income. Non-farm activities of the respondents involved Govt. or private jobs and business. The reason behind more people being involved in agriculture may be due to unemployment prevailing among the respondents. It was observed that most of the respondents (40.83%) had received one day non- formal training from some institution. Around 33.33 per cent respondents had not received any training exposure followed by 19.17 per cent respondents who had received exposure to 3-day training. Just a handful (3.33 %) of respondents had received three days or four days training and above.

Table 3: Distribution of the respondents according to their personal characteristics

Particulars	Category	Percentage (%)
Age	Young	25.83
	Middle	58.33
	Old	15.84
Education	Illiterate	-
	Primary School Passed	1.67
	Middle School Passed	20.83
	HSLC	30.83
	Higher secondary passed	36.67
	Graduate and above	10
Land Holding	Marginal	7.5
	Small	28.33
	Medium	36.67
	Big	27.5
Source of income	Only farming	59.17
	Farming+ Non-Farm	40.83
Training Exposure	No training	33.33
	1 day training	40.83
	2 days training	19.17
	3 days training	3.33
	4 days training and above	3.33

Majority of the respondents (41.67%) belong to medium income category followed by high income category (38.33%) and low income category (20.00%).This may be due to fact that almost 40 per cent of the respondents possessed job or business as another source of income. The finding is similar to Suresh (2004) and Sagamesh (2006). Majority of the respondents had low level (60.83%) of extension contact followed by 37.50 per cent of respondents who had medium level of extension contact. A very few respondents were found to be having high level (2.00%) of extension contact. Same finding was observed by Tiwari *et al.* (2007). This may be due to the inadequacy in extension contact and relatively less activities of various departments, lack of regular visits of extension workers to the interior areas, less participation of the respondents ensured in extension programmes and activities, inability of the extension workers to reach out to all sections of the people etc. It can be observed that for majority of the respondents (65.00%), the information source utilization was medium, followed by 18.33 per cent respondents who had high level of information source utilization. Only 13.33 per cent of the respondents had low level of information source utilization. The result is in line and agreement with the findings of Tiwari *et al.* (2007). It was found that majority of the respondents utilised information sources like fellow farmers, family members, neighbours and sometime extension personnel of agriculture and fishery departments. Electronic medium like radio are also used to gather information. Majority of the respondents (75.00%) had medium level of economic motivation followed by low level (14.17%) and only 10.83 per cent of the respondents had high level of economic motivation. This finding reveals that though in this age everything is measured in terms of economic profit and value, there were individuals whose economic condition was medium and poor, but still did not define and take up everything in economic terms. Majority of the respondents (83.33%) had medium level of scientific orientation followed by 12.50 per cent having high level and only 4.17 per cent of the respondents having low level of scientific orientation. The reason for medium level and high level of scientific orientation may be due to the existing awareness level of the respondents. Most of the respondents were in the age group of middle and young who had high degree of scientific orientation. The reason for low level may be due to lack of awareness and most of them belonged to old age group. Majority of the respondents (70%) had medium level of risk preference ability followed by high level (15.83%) and slightly less in low level (14.17%). The finding is similar to Rathinsabapthi (1987) and Nagaraja (2002).This low and medium level of risk preference by the respondents may be attributed to the facts like poor economic condition, medium and low level of economic motivation, *etc.* It was observed that 70.83 per cent of respondents possess medium level of decision making ability followed by high and low level of 15 per cent and 14.17 per cent respectively. This may be due to fact that the respondents have low level of managerial ability and less risk taking ability. The result is in consistence with the findings of Chandrapaul (1988). Majority of the respondents (68.33%) believed that financial support from external sources would help in adopting an Integrated Farming followed by 20.84 per cent and 10.83 per cent high and low, respectively. It may be attributed to the fact that most of the respondents did not go for external source of finance because of the long formal procedure, lack of knowledge, lack of motivation, debt due to non-repayment of previous loan, *etc.* The same result have been observed by Subramanyam (2002)

Table 4: Distribution of the respondents according to their economic and psychological characteristics

Range	Percentage of respondents (%)							
	Annual income	Extension Contact	Information Source utilization	Economic Motivation	Scientific orientation	Risk preference	Decision making ability	Source of finance
Low	20	60.83	16.67	14.17	4.17	14.17	14.17	10.83
Medium	41.67	37.50	65.00	75.00	83.33	70.00	70.83	68.33
High	38.33	1.67	18.33	10.83	12.50	15.83	15.00	20.84

It was observed that age, education, land holdings, annual income, source of income, extension contact, extension contact, training exposure, information source utilization, scientific orientation, risk preference and decision making ability are not associated with adoption of IFS while economic motivation and source of finance are associated with the adoption of IFS.

Table 5: Association of various socio-personal, socio-economic, communication and psychological characteristics among the different combination of Integrated Farming System

Variables	Chi-square value
Age	24.59
Education	45.28
Land holdings	32.22
Annual income	19.43
Source of income	17.10
Extension contact	28.65
Training exposure	51.48
Information source utilization	25.35
Economic motivation	40.02**
Scientific orientation	25.53
Risk preference	28.97
Decision making ability	23.14
Source of finance	36.43**

**Significant at 0.05%

The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents. Banerjee *et al.* (1990), Thamrongwarangkul (2001) and Tipraqsa *et al.* (2007) also identified capital as one of the main constraints of IFS. This problem might be encountered by respondents due to more investment in single farming i.e., giving more importance to a single component and thus hampering the investment in the other component of Integrated Farming System. Also there was a lack of financial assistance from external financial organization. Lack of knowledge and skill was an important problem perceived by respondents which accounted for 56.67 per cent. The respondents also possessed inadequate knowledge about the modern techniques in Integrated Farming and interrelation among various components. Social problems and lack of motivation accounted for 31.67 per cent of respondents which may be due to lack of scientific

Table 6: Distribution of the respondents according to their problems of IFS

Problem	Cumulative Frequency	Percentage (%)	Rank
Disease and pest problems in plants or/and animals	120	100	1st
Economic and other financial problems	103	85.83	2nd
Lack of knowledge and skills	68	56.67	3rd
Social problems	38	31.67	4th
Non-availability of labour	12	10	5th

CONCLUSION

The components of IFS were by default interrelated. It has a vast scope for improving productivity and profitability of farms by way of recycling of on-farm resources. Despite vast potentiality of IFS in the study area there, scientific way of farming is yet to be initiated. It was also observed that there was a considerable gap between the extension workers and the farmers and this distance can be narrowed down by creating a favourable environment for dissemination of knowledge and skills to bring changes in the behaviour and attitude of the farmers. So the government should take necessary steps and take a favourable policy decision for enhancement of the farmer in micro level and overall development of India at the macro level.

Paper received on : January 09, 2019
Accepted on : January 15, 2019

REFERENCES

Banerjee, B. N., Sarker S. C. and Maity A. K. (1990). Impact of resource optimization on cropping pattern and income on crop-dairy mixed farm. *Indian Journal of Dairy Science,* 43: 295-301.

Bhowmick, B.C. *et al.* (1999). Economics of Different Farming System in Sonitpur District of Assam, Non-Project Faculty Research, Department of Agricultural Economics, Assam Agricultural University, Jorhat-13

Chandrapaul, K. (1998) A study on entrepreneurial behaviour of vegetable growers in Krishna district of Andhra Pradesh. M.Sc. (Agri.) Thesis, Acharya N. G. Ranga Agricultural University, Hyderabad.

Jayanthi, C, et al. (2000). "Water budgeting for components in lowland Integrated Farming System. *Agricultural Journal,* 87: 411-414

Nagaraja, M.V. (2002). A study on knowledge of improved cultivation practices of sugarcane and their extent of adoption by farmers in Bhadra Command Area in Davanagere district, Karnataka State. *Ph.D. Thesis, University of Agricultural Sciences,* Dharwad.

Okigbo, B.N. (1995). Major farming system of lowland Asavanna of SSA and the potential for improvement. In: Proceeding of the IITA/FAO workshop, Ibadan, Nigeria.

Perumathiyalangaan and Subramanian, R. (1998), Characteristics of Tamil Nadu poultry farmers. *Journal of Extension Education,* 9(4): 254-255.

Prasad, T.S. (2003). Differential innovation decision and attitude of rice growing farmers towards eco-friendly technologies In Andhra Pradesh: A critical analysis. Ph.D. Thesis, Acharya N.G. Ranga Agricultural University, Hyderabad.

Puthirapratap, O. and Vasantakumar, J. (1999). Profile characteristics and overall participation of members of credit management groups. *Maharasthra Journal of Extension Education,* 10(2): 2451-2454.

Radhammani, S, *et al.* (2003). Sustainable Integrated Farming system for dryland: A review. *Agricultural Reviews,* 24:204-210

Rathinsabapathi, S. (1987). A study on the knowledge and

extent of adoption of integrated pest management for cotton. M.Sc.(Agri.) Thesis, Tamil Nadu Agriculture University, Coimbatore.

Sangamesh, P.S. (2006). A comparative profile analysis of rural youth in rainfed and irrigated tract of Bagalkot district. M.Sc. (Agri.) Thesis, University of Agricultural Science, Dharwad.

Saravankumar, R. (1996) A study on management of mango gardens by the farmers in Krishnagiritaluk of Dharmapuri district. M.Sc. (Agri.) *Thesis,* University of Agricultural Sciences, Dharwad

Sharma, A. (1994). A study on the attitude of the rural youth and their extent of participation in farming. M. Sc. (Agri.) Thesis, Assam Agricultural University, Jorhat.

Soni, R. P., Katoch, M., & Ladohia, R. (2014). Integrated Farming Systems-A Review. *Journal of Agriculture and Veterinary Science,* 7(10), 36-42.

Subramanyam, I. (2002), A study on the impact of agricultural market yard committee level training programmes in Nellore district of Andhra Pradesh. M. Sc. (Agri.) Thesis, Acharya N. G. Ranga Agricultural University, Hyderabad.

Suresh (2004), Entrepreneurial behaviour of milk producers in Chittoor district of Andhra Pradesh : A critical study. M.V.Sc. Thesis, Acharya N. G. Ranga Agricultural University, Hyderabad.

Thamrongwarangkul, A. 2001.For out Thailand. Annual report on sustainable community development for good livelihoods and environmental project. Khon Kaen University.

Tipraqsa, P. 2006. Opportunities and constraints of integrated farming system in Northeast Thailand. A case study of the HuaiNong Ian catchment, KhonKaen Province. Ecology Development Series No. 35. University of Bonn. Cuvillier Verlag, Göttingen, Germany.

Tiwari, S. G.; Saxena, K. K.; Khare, N. K. and Khan, A. R. (2007), Factors Associated with Adoption of Recommended Practices of Pea. *Indian Research Journal Of Extension Education,* 7(2-3): 60-61