



# Livelihood Enhancement of Scheduled Caste Farmers through Integrated Farming System in Kolar District, India

V. L. Madhuprasad <sup>a++</sup>, Chandrashekar, S. <sup>b#</sup>  
and Harshitha, D. <sup>a†\*</sup>

<sup>a</sup> Directorate of Extension, UAS, Bangalore-560065, India.

<sup>b</sup> Department of Sericulture, UAS, Bangalore-560065, India.

## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

The study was conducted in purposively selected Kolar district, a total sample of 353 respondents were purposively selected for the study. Data was collected by using pretested structured interview schedule and analyzed by using appropriate statistical tools. The results revealed that a majority of the respondents belonged to low category of mass media exposure, medium category of education, livestock possession, cosmopolitanism, extension participation, social participation, scientific orientation, risk orientation, training undergone followed by high category of cropping pattern, innovativeness, management orientation, level of aspiration, participation in the

<sup>++</sup> Director of Extension;

<sup>#</sup> Professor;

<sup>†</sup> Assistant Professor(C);

\*Corresponding author: E-mail: drharshithad@gmail.com;

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developmental programmes, willingness towards IFS, access to extension personnel and access to resources. Livelihood Security of respondents in 'highly satisfied category' increased to 37.96 per cent from 28.33 per cent out of seven dimensions, maximum increase was noticed in economic efficiency (52.71%). The personal, socio-economic and psychological characteristics such as cropping pattern, livestock possession, risk orientation, training undergone, access to extension personnel and access to resources had positive and significant relationship with livelihood security. The multiple regression value indicated that all the 18 independent variables had contributed to the tune of 23.20 per cent of variation in livelihood security of the respondents. The results pertaining to economic analysis indicated that BC ratio has been increased to 2.98 from 1.93 in crop component and with respect livestock component BC ratio was found to be enhanced to 3.18 from 1.93 after the implementation of the project. Hence, the concerned development departments should organize the demonstrations, trainings, field days, exposure visits etc., to educate the farmers about IFS. The positive and significantly related characteristics need to be considered while selecting the farmers for the extension educational programmes to enhance their livelihood security.

*Keywords: Integrated farming system; scheduled caste and livelihood security.*

## 1. INTRODUCTION

"The number of farm households has increased significantly, leading to fragmentation of land holdings and declining size of average land holding in India. Small and marginal farmers are unable to adopt advance and innovative technologies, mechanization, use of improved and high-yielding varieties, inputs like seeds, fertilizers etc." [1]. "Further, due to limited access to markets and absence of institutions to safeguard the interests. Currently, 87 per cent of the farmers are small holders cultivating on an average about 1.01 hectare of land. They own only 47% of total cultivated area. Small holders do not have enough bargaining power to negotiate in input or output market in their favour" [2]. "Due to ever increasing population and decline in per capita availability of land in the country, practically there is no scope for horizontal expansion of land for agriculture. Only vertical expansion is possible by integrating farming components requiring lesser space and time and ensuring reasonable returns to farm families. The Indian marginal and small farmers are mostly concentrating on Cereal- based crop production with high risks of climate anomalies such as floods and droughts. Due to these aberrations, farmers are unable to get sufficient income to sustain their family livelihood" [3]. "The Integrated Farming System therefore assumes greater importance for sound management of farm resources to enhance the farm productivity and reduce the environmental degradation, improve the quality of life of resource poor farmers and maintain sustainability. The Indian marginal and small farmers are mostly concentrating on Cereal- based crop production with high risks of climate anomalies such as

floods and droughts. Due to these aberrations, farmers are unable to get sufficient income to sustain their family livelihood" [2,4]. "Most of the scheduled caste farmers comes under small and marginal category of land holding and agricultural labourers. They are directly or indirectly depend on agriculture for their livelihood. The per capita land holding of SC farmers is 1.3 ha as against state average of 1.74 ha" [5]. These farmers are doing farming activity to fulfill the basic needs of house hold including food (cereal, pulses, oilseeds, milk, fruit, honey, meat, etc.), feed, fodder, fiber, etc. but their main focus was individual components but not in an integrated manner and this made attention about Integrated Farming System. On the other side livelihood is rapidly gaining acceptance as a valuable means of understanding the factors that influence people's lives and well - being. It is comprised of capacities, assets, activities and coping strategies to overcome crisis required for means of living. Livelihood is the means people use to support themselves, to survive and to prosper. It is an outcome of how and why people organize to transform the environment to meet their needs through technology, labour, power, knowledge and social relations.

"At the ICAR and State Agricultural Universities level, lot of efforts have been made aiming at increasing the productivity of different components of farming system i.e. crops, horticultural crops, livestock (dairy, goatry, piggery), poultry (chicken, ducks, quail, pigeons), lac cultivation, apiculture, sericulture, mushroom cultivation, organic manures production, bio-gas etc. individually but lacking in their integration by following farming system approach. The integration is made in such a way that product of

one component should be the input for other enterprises with high degree of complimentary effects on each other. The University of Agricultural Sciences, Bangalore implemented the project entitled “Livelihood Improvement of Scheduled Caste (SC) Farm Families through Integrated Farming System (IFS)” with the financial support from the Government of Karnataka under Scheduled Caste Sub Plan (SCSP) during the period from 2014-15- to 2018-19. The project aims at sustainable development of agriculture among the SC farmers by bringing them to mainstream and also efficient management of soil, water, crop and IPM practices in crop husbandry” [5]. Further, it integrate dairy, poultry, sheep, piggery, fishery, sericulture, agro-forestry and other related enterprises with crop husbandry which increases the overall net income. With this background, the present study is conceptualized to following objectives.

1. To know the personal, socio-economic and psychological characteristics of respondents
2. To measure the livelihood security of SC farmers practicing Integrated Farming System
3. To ascertain the relationship between personal and socio-psychological characteristics of respondents with their livelihood security
4. To know the economic analysis of Integrated Farming System on development of SC farmers

## 2. METHODOLOGY

The study was conducted in purposively selected Kolar district of Karnataka based on the implementation of the project entitled “Livelihood Improvement of Scheduled Caste (SC) Farm Families through Integrated Farming System (IFS)” by UAS (B) during 2014-15 to 2018-19. Two taluks were selected namely Kolar and Srinivasapura and two grama panchayats from each taluk and 3 to 4 villages/ grama panchayat were selected based on maximum number of SC farm families. All the farm families having land holding 1 to 5 acres were considered as beneficiaries (respondents) of the project. A total of 353 respondents were purposively selected for the study. Data was analyzed by using mean,

percentage, standard deviation, correlation coefficient and regression coefficient.

## 3. RESULTS AND DISCUSSION

The results given in the Table 1 revealed that, a majority of the respondents belonged to low category of mass media exposure followed by medium category of education, livestock possession, cosmopolitaness, extension participation, social participation, scientific orientation, risk orientation, training undergone and high category of cropping pattern, innovativeness, management orientation, level of aspiration, participation in the developmental programmes, willingness towards IFS, access to extension personnel and access to resources. The possible reasons for above trend is due to poverty and other social stigma in the rural areas respondents found to have medium level of education and the land holding distribution is matching with the general trends in the country that, 87 per cent of the land holding in the country are marginal and small holdings and another supporting reason that could be attributed to this trend might be due to fragmentation of land, the ancestral lands were broken into smaller units, due to increase in nuclear family size. With respect to mass media exposure and cosmopolitaness, the accessibility to the mass media such as television, radio, newspapers and farm magazines was found to be less. Farmers hardly have the habit of reading newspaper and farm magazines because majority of them had low education level and lack of time and interest in travelling to cities and exposing to mass media as well. They may not listen to radio programmes and watch television due to irregular and less power supply in rural areas. The results of the present study are in conformity with the findings of Mamathalakshmi [6], Harshitha et al. [7] and Venkatarreddy [8].

The findings presented in Table 2 indicated that, livelihood security of respondents in ‘highly satisfied category’ increased to 37.96 per cent from 28.33 per cent after implementation of the project. Because of the intervention of diversified cropping pattern and livestock component in the farming activity, the income of the farmers was increased and in turn it might have contributed to enhancement in the satisfaction level of the farmers. The findings seek support from the studies of Sujay Kumar [9] and Shwetha & Shivalingiah [10].

**Table 1. Distribution of respondents according to their personal, socio-economic and psychological characteristics (n=353)**

Sl. No.	Characteristics	Category	Number	Per cent
1.	Education	Low	74	20.96
		Medium	205	58.07
		High	74	20.96
2.	Land holding	Marginal	152	43.06
		Small	102	28.90
		Big	99	28.05
3.	Cropping pattern	Low	120	33.99
		Medium	107	30.31
		High	126	35.69
4.	Livestock possession	Low	115	32.58
		Medium	132	37.39
		High	106	30.03
5.	Cosmopolitaness	Low	116	32.86
		Medium	128	36.26
		High	109	30.88
6.	Innovativeness	Low	118	33.43
		Medium	110	31.16
		High	125	35.41
7.	Mass media exposure	Low	122	34.56
		Medium	120	33.99
		High	111	31.44
8.	Extension participation	Low	108	30.59
		Medium	137	38.81
		High	108	30.59
9.	Social participation	Low	90	25.50
		Medium	136	38.53
		High	127	35.98
10.	Scientific orientation	Low	103	29.18
		Medium	142	40.23
		High	108	30.59
11.	Management orientation	Low	98	27.76
		Medium	126	35.69
		High	129	36.54
12.	Level of aspiration	Low	110	31.16
		Medium	111	31.44
		High	132	37.39
13.	Risk orientation	Low	107	30.31
		Medium	125	35.41
		High	121	34.28
14.	Training undergone	Low	73	20.68
		Medium	207	58.64
		High	73	20.68
15.	Participation in the developmental programmes	Low	73	20.68
		Medium	120	33.99
		High	160	45.33
16.	Willingness towards IFS	Low	114	32.29
		Medium	102	28.90
		High	137	38.81
17.	Access to extension personnel	Low	111	31.44
		Medium	112	31.73
		High	130	36.83
18.	Access to resources	Low	112	31.73
		Medium	103	29.18
		High	138	39.09

**Table 2. Distribution of respondents according to their livelihood security (n=353)**

Category	Before		After		Change in Per cent
	Number	Per cent	Number	Per cent	
Less satisfied	143	40.51	97	27.48	-13.03
Satisfied	110	31.16	122	34.56	3.4
Highly Satisfied	100	28.33	134	37.96	9.63
<b>Total</b>	<b>353</b>	<b>100.00</b>	<b>353</b>	<b>100.00</b>	

**Table 3. Dimension-wise analysis of livelihood security pattern among respondents in Kolar district (n=353)**

Sl. No.	Dimensions	Mean Value		Percentage in increase
		Before	After	
1	Assets	1268	1668	31.55
2	Living amenities	1321	1732	31.11
3	Economic efficiency	628	959	52.71
4	Ecological security	798	1067	33.71
5	Social equitability	772	1002	29.79
6	Coping strategies against stress	796	1078	35.43
7	Employment security	1065	1605	50.70
	<b>Overall Livelihood Security</b>	<b>6648</b>	<b>9111</b>	<b>37.05</b>

**Table 4. Relationship between personal, social, economic and psychological characteristics with livelihood security of farmers (n=353)**

Sl. No.	Independent variables	Correlation co-efficient (r)
1.	Education	0.002 <sup>NS</sup>
2.	Land holding	-0.003 <sup>NS</sup>
3.	Cropping pattern	0.162 <sup>**</sup>
4.	Livestock possession	0.147 <sup>**</sup>
5.	Cosmopolitaness	-0.044 <sup>NS</sup>
6.	Innovativeness	0.089 <sup>NS</sup>
7.	Mass media exposure	-0.021 <sup>NS</sup>
8.	Extension participation	-0.011 <sup>NS</sup>
9.	Social participation	0.103 <sup>NS</sup>
10.	Scientific orientation	-0.018 <sup>NS</sup>
11.	Management orientation	-0.062 <sup>NS</sup>
12.	Level of aspiration	-0.115 <sup>NS</sup>
13.	Risk orientation	0.195 <sup>**</sup>
14.	Training undergone	0.240 <sup>**</sup>
15.	Participation in the developmental programme	0.054 <sup>NS</sup>
16.	Willingness towards IFS	0.028 <sup>NS</sup>
17.	Access to extension personnel	0.182 <sup>**</sup>
18.	Access to resources	0.373 <sup>**</sup>

NS: Non-Significant; \*\*: Significant at 1% level

The results depicted in Table 3 indicated that, there is an improvement in different dimensions of livelihood security after the implementation of project. Out of seven dimensions, maximum increase was noticed in economic efficiency (52.71%) followed by employment security (50.70%), coping strategies against stress (35.43%), by ecological security (33.71%), assets (31.55%), living amenities (31.11%) and social equitability (29.79%).

With respect to overall livelihood security of SC farmers increased by 37.05 per cent after implementation of the IFS project. Livestock and Crop component of IFS generated extra man days of employment per annum and judicious utilization of resources in IFS ensures ecological development in the farming system. The similar findings obtained by Mamathalakshmi [6] and Venkatareddy [8].

**Table 5. Multiple regression analysis of personal, socio-economic and psychological characteristics of respondents with their livelihood security (n=353)**

Sl. No	Variables	Regression coefficient (b)	Std. Error of regression co-efficient (SE <sub>b</sub> )	't' value
1	Education	0.008	0.224	0.034 <sup>NS</sup>
2	Land holding	-0.769	0.357	-2.156*
3	Cropping pattern	0.029	0.024	1.204 <sup>NS</sup>
4	Livestock possession	0.128	0.065	1.979*
5	Cosmopolitaness	-0.099	0.137	-0.722 <sup>NS</sup>
6	Innovativeness	0.137	0.156	0.880 <sup>NS</sup>
7	Mass media exposure	-0.027	0.130	-0.211 <sup>NS</sup>
8	Extension participation	-0.015	0.132	-0.117 <sup>NS</sup>
9	Social participation	0.172	0.093	1.843 <sup>NS</sup>
10	Scientific orientation	-0.001	0.111	-0.005 <sup>NS</sup>
11	Management orientation	-0.133	0.100	-1.329 <sup>NS</sup>
12	Level of aspiration	-0.093	0.069	-1.340 <sup>NS</sup>
13	Risk orientation	0.104	0.077	1.347 <sup>NS</sup>
14	Training undergone	0.554	0.232	2.384*
15	Participation in the developmental programme	0.331	0.293	1.130 <sup>NS</sup>
16	Willingness towards IFS	-0.001	0.075	-0.012 <sup>NS</sup>
17	Access to extension personnel	0.127	0.072	1.767 <sup>NS</sup>
18	Access to resources	0.346	0.057	6.068**

$R^2 = 0.232$ ,  $F = 5.614$ ; NS: Non-Significant; \*: Significant at 5% level; \*\*: Significant at 1% level

The findings in the Table 4 implied that, six out of 18 characteristics found to have significant relationship with livelihood security. The personal, socio-economic and psychological characteristics such as cropping pattern, livestock possession, risk orientation, training undergone, access to extension personnel and access to resources had positive and significant relationship with livelihood security. The possible reasons for the positive and significant relationship between land holding and livelihood security might be due to inputs such as seeds and livestock components were provided free of cost to respondents under the project which leads them to get engaged in rearing of livestock as subsidiary occupation and gets additional income by selling milk and meat apart from crop production. Cropping pattern have positive and significant relationship with livelihood security, as farmers mainly depends on farming, increased in cropping pattern and adopted the new technologies advocated by the scientists led to higher productivity, profitability fetching higher income and generated employment. Training undergone had positive and significant relationship with livelihood security the possible reason for such result might be due to the reason that, respondents spent greater amount of time in IFS to fulfill their aspirations such as multiple cropping, dairy, piggery, sheep rearing and poultry etc. The participation in training

programmes enhanced their knowledge. Further, respondents directly influenced by the training undergone. Regular contact with the project personnel, agriculture officers, scientists of agriculture university might have developed interests towards IFS. Being an IFS farmer, effective utilization of available resources leads to higher productivity, profitability, employment generation and farm income. The findings are in conformity with the results obtained by Mamathalakshmi [6], Harshitha et al. [7] and Venkatareddy [8].

The contribution of independent variables to the livelihood security of the respondents was assessed and illustrated in the Table 5. The findings conveyed that only four independent variables such as land holding, livestock possession, training undergone and access to resources had contributed significantly to livelihood security of the respondents towards IFS. The remaining variables had not contributed significantly towards variability in livelihood security of respondents. The  $R^2$  value indicated that all the 18 independent variables had contributed to the tune of 23.20 per cent of variation in livelihood security of the respondents towards IFS. The possible reason with regard to the extent of contribution of independent variables to variation in livelihood security of the respondents is due to land holding, livestock

**Table 6. Economic analysis of Integrated Farming System (IFS) components before and after implementation of project in Kolar district (n=353)**

Crop Component	Before										After													
	Avg. Land Holding (Acre.)	Avg. Yield (Ql./ac.)	Avg. yield of Beneficiary farmers (Ql./ac.)	Price (Rs./Ql.)	Prod. Cost/ac. (Rs.)	Prod. Cost of Beneficiary farmers(Rs.)	Gross Income (Rs./ac.)	Net Income (Rs./ac.)	B:C Ratio	Avg. Yield (Ql./ac.)	Avg. yield of Beneficiary farmers (Ql./ac.)	Price (Rs./Ql.)	Prod. Cost/ac. (Rs.)	Prod. Cost of Beneficiary farmers(Rs.)	Gross Income (Rs./ac.)	Net Income (Rs./ac.)	B:C Ratio	Change in yield (%)	Change in Income (%)	Emply. Gene. in (Mandays/ac.)	Emply. Gene. of Beneficiary farmers (Mandays)			
Ragi (n1=202)	0.60	6.50	3.90	1450.00	5120.00	3072.00	5655.00	2583.00	1.84	9.50	5.70	1900.00	6700.00	4020.00	10830.00	6810.00	2.69	46.15	91.51	84.00	50.40			
Maize (n2=151)	0.53	6.00	3.18	1300.00	3784.00	2005.52	4134.00	2128.48	2.06	8.00	4.24	1450.00	4100.00	2173.00	6148.00	3975.00	2.83	33.33	48.72	63.00	33.39			
Redgram*										1.50	0.90	3400.00	800.00	480.00	3060.00	2580.00	6.38			7.00	4.20			
Cowpea*										0.60	0.32	3600.00	800.00	424.00	1144.80	720.80	2.70			5.00	2.65			
<b>Total</b>						<b>5077.52</b>	<b>9789.00</b>	<b>4711.48</b>	<b>1.93</b>					<b>7097.00</b>	<b>21182.80</b>	<b>14085.80</b>	<b>2.98</b>		<b>116.39</b>		<b>90.64</b>			
Livestock Component	Body live wt. or Ltrs/ sheep or poultry or pig or cow				Cost				Gross Income (Rs.)				Net Income (Rs.)				B:C Ratio				Body live wt. or Ltrs/ sheep or poultry or pig or cow			
	Price/kg or Ltr																							
Cow (n1=183)																								
Sheep (n2=158)																								
Poultry (n3=278)																								
Piggery (n4=12)																								
<b>Total</b>																								
<b>Grand total</b>					<b>5077.52</b>				<b>9789.00</b>				<b>4711.48</b>				<b>1.93</b>							
* Inter crop																								

possession, training undergone and access to resources characteristics of respondents were the factors going to influence directly on livelihood security of the respondents. Independent variables have synergic effects to one another, complimenting each other to have a major extent of contribution towards the livelihood security of farmers.

Livestock and crop component generated 543.64 man days of employment per annum and Rs. 115777.80 net income to beneficiary farmers. The average gross income of Rs. 168874.80 from both crop and livestock enterprises of IFS against Rs.4711.48 before implementation of the project. As such, for every one rupee investment under IFS farmers earned Rs. 3.18 income where in BC ratio has been increased to 2.98 from 1.93 in crop component and with respect livestock component BC ratio was found to be enhanced to 3.18 from 1.93. The probable reason for the observed trend is that, Integrated farming system provides opportunity to utilize the resources effectively. Crop diversification, integration of different farming systems provided regular income through the sale of milk, butter /ghee, egg and manure. Minimum use of off-farm inputs, maximum used on-farm inputs and wastes recycling helped to increase and sustain profitability of farm.

#### 4. CONCLUSION

Based on the findings it can be concluded that, the results revealed that, the livelihood security of respondents in 'highly satisfied category' increased to 37.96 per cent from 28.33 per cent., Out of seven dimensions, maximum increase was noticed in economic efficiency (52.71%) six out of 18 characteristics found to have significant relationship with livelihood security. A positive and substantial link was found between livelihood security and personal, socioeconomic, and psychological aspects such as cropping pattern, ownership of animals, risk orientation, training received, access to extension staff, and resource availability. The  $R^2$  value indicated that all the 18 independent variables had contributed to the tune of 23.20 per cent of variation in livelihood security of the respondents towards IFS. Therefore, the program to increase IFS operations for resource-poor farmers should be planned by the relevant development departments. To improve their livelihood security, farmers must be selected for IFS programs based on positive and significantly associated traits.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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 writing or editing of manuscripts.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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