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### Impact of integrated farming system on development of scheduled caste farmers in Tumakuru district of Southern Karnataka

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#### Abstract

The study was conducted in purposively selected Tumakuru district, a total sample of 240 respondents were purposively selected for the study. Data was collected by using pretested structured interview schedule and analysed by using appropriate statistical tools. The results revealed that majority of the respondents found to have marginal land holding and belonged to low level of education, cropping pattern, cosmopolitanness, innovativeness, mass media exposure, extension participation and level of aspiration followed by medium category of training undergone and willingness in agriculture and high level of livestock possession, social participation and risk orientation. It was observed that, the livelihood security of respondents in 'highly satisfied category' increased to 40.42 percent from 27.08 percent, out of seven dimensions maximum increase was noticed in employment security (60.15%) followed by ecological security (47.80%), living amenities (45.73%), assets (40.81%), economic efficiency (34.51%), coping strategies against stress (32.53%) and social equitability (28.80%) and overall livelihood security increased by 42.15 percent after implementation of project. Further, livestock and crop component generated 583.64 mandays of employment per annum and Rs. 1,30,553.50 net income to beneficiary farmers. The average gross income of Rs. 1,91,745.50 from both crop and livestock enterprises of IFS against Rs. 6,513.00 before implementation of the project. As such, for every one rupee investment under IFS they are getting Rs. 3.13 rupee income. The characteristics such as land holding, cropping pattern, livestock possession, cosmopolitanness, innovativeness, mass media exposure, extension participation, level of aspiration, training undergone and willingness in agriculture had positive and significant relationship with livelihood security. The R<sup>2</sup> value indicated that, all the 13 independent variables had contributed to the tune of 63.40 percent of variation in livelihood security. Hence, the positive and significantly related characteristics need to be considered while selecting the farmers for the extension educational programmes to enhance their livelihood security by the concerned development departments.

**Keywords:** Integrated farming system, scheduled caste and livelihood security

#### Introduction

Agriculture is the most important livelihood option in India, with two third of the country's workforce depending on farming. Majority of them are small and marginal farmers, which has accounted for around 87 percent of the operational holdings are less than two hectares (Kumar *et al.*, 2020) [3]. Increasing land fragmentation, diminishing natural assets, high costs for external farm inputs, indebtedness and pesticide-related health issues have threatened the livelihoods of many farm families. Integration of farm enterprises provides better livelihood in terms of increased food production, higher net income and improved health, habitat, educational and social status. Therefore introduction of appropriate farming systems is going to be one of the important approaches to achieve better growth in agriculture and securing livelihoods of major segment of society. Through Integrated Farming System (IFS) it is possible to reach the high level of productivity in more sustainable way with proportionately less input. The University of Agricultural Sciences (UAS),

Bangalore has 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). The project aims at sustainable development of agriculture among the SC farm families by bringing them to mainstream and also efficient management of soil, water, crop and Integrated Pest Management practices in crop husbandry. Further, it integrate dairy, poultry, sheep, piggery, fishery, sericulture, agro-forestry and other related enterprises with crop husbandry which increases the overall net income.

In Karnataka, the Scheduled Caste (SC) population comprised of 17.15 percent and majority of them belongs to small & marginal farmers and agricultural labourers (Anon, 2018). 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. with fragile resource base, the agricultural production systems of these farmers largely dependent on monsoon, coupled with

fragmentation of land resulted in low production and productivity. They are more exposed to the constant threat of poverty, illiteracy, hunger, starvation, malnutrition and migration to urban areas. Having understood the SC farmers have the potentiality to perform the diversified operations / practices of production systems, integration of appropriate possible number of farming system components out of the available alternatives (crop production, dairy, sheep, piggy, poultry, fisheries sericulture, apiculture, mushroom production, horticulture, agro-forestry, post-harvest and value additions etc.) with due considerations to improve their livelihood is the way out for betterment of SC farmers. With this background, the present study is conceptualized with 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

### Methodology

The study was conducted in purposively selected Tumakuru district based on the implementation of the project entitled "Livelihood Improvement of Scheduled Caste (SC) Farm Families through Integrated Farming System (IFS)" by University of Agricultural Sciences, Bangalore during 2014-15 to 2018-19. A Total sample of 240 respondents were purposively selected for the study from two taluks and two grama panchyaths based on maximum number of SC farm families. All the farm families having land holding 1 to 5 acres of dry land were considered as beneficiaries (respondents) under the project. Data was collected using structured pretested interview schedule and analysed using mean, percentage, standard deviation and correlation coefficient.

### Results and Discussion

**Table 1:** Distribution of respondents according to their personal, socio-economic and psychological characteristics

(n=240)

Sl. No.	Variables	Category	Number	Percent
1.	Education level	Low	86	35.83
		Medium	81	33.75
		High	73	30.42
2.	Land holding	Marginal	100	41.66
		Small	90	37.50
		Big	50	20.84
3.	Cropping pattern	Low	91	40.83
		Medium	69	28.75
		High	80	30.42
4.	Livestock possession	Low	76	31.68
		Medium	61	25.41
		High	103	42.91
5.	Cosmopolitaness	Low	104	43.33
		Medium	62	25.83
		High	74	30.84
6.	Innovativeness	Low	101	42.08
		Medium	41	17.08
		High	98	40.84
7.	Mass media exposure	Low	93	38.75
		Medium	58	24.17
		High	89	37.08
8.	Extension Participation	Low	98	40.83
		Medium	51	21.25
		High	91	37.92
9.	Social participation	Low	75	31.25
		Medium	77	32.08
		High	88	36.67
10.	Level of aspiration	Low	91	37.91
		Medium	80	33.34
		High	69	28.75
11.	Risk orientation	Low	73	30.41
		Medium	75	31.25
		High	92	38.34
12.	Training undergone	Low	77	32.08
		Medium	82	34.16
		High	81	33.76
13.	Willingness in agriculture	Low	57	23.75
		Medium	141	58.75
		High	42	17.50

The results given in the Table 1 revealed that, majority of the respondents found to have marginal land holding and belonged to low level of education, cropping pattern, cosmopolitaness, innovativeness, mass media exposure, extension participation and level of aspiration followed by medium category of training undergone and willingness in agriculture and high level of livestock possession, social participation and risk orientation. The possible reason for low category of above mentioned variables could be due to poverty and other social stigma in the rural areas respondents found to have low level of education and the land holding distribution is matching with the general trends in the country that more than 87 percent of the land holding in the country are marginal and small holding due to

predominance of nuclear family and land fragmentation, the ancestral lands were broken into smaller units. With respect to low level of 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 (2013) [4], Harshitha *et al.*, (2018) [2] and Venkatareddy (2021) [7].

**Table 2:** Distribution of respondents according to their livelihood security

(n=240)

Category	Before		After		Change in Percent
	Number	Percent	Number	Percent	
Less satisfied	84	35	75	31.25	-5.00
Satisfied	91	37.92	68	28.33	-5.66
Highly Satisfied	65	27.08	97	40.42	10.67
Total	240	100	240	100	

The findings presented in Table 2 indicated that, Livelihood Security of respondents in ‘highly satisfied category’ increased to 40.42 percent from 27.08 percent 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 (2018) [3] and Shwetha & Shivalingiah (2019) [5].

**Table 3:** Dimension-wise analysis of Livelihood Security among respondents in Tumakuru district

(n=240)

Sl. No.	Dimension	Mean Value		Percentage in increase
		Before	After	
1	Assets	892	1256	40.81
2	Living amenities	960	1399	45.73
3	Economic efficiency	452	608	34.51
4	Ecological security	569	841	47.80
5	Social equitability	736	948	28.80
6	Coping strategies against stress	707	937	32.53
7	Employment security	813	1302	60.15
	Overall Livelihood Security	5129	7291	42.15

The results depicted in Table 3 indicated that, there is a improvement in different dimensions of Livelihood Security after the implementation of the project in Tumakuru district. Out of seven dimensions, maximum increase was noticed in employment security (60.15%) followed by ecological security (47.80%), living amenities (45.73%), assets (40.81%), economic efficiency (34.51%), coping strategies against stress (32.53%) and social equitability (28.80%) and overall livelihood security increased by 42.15 percent 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 (2013) [4], Harshitha *et al.*, (2018) [2] and Venkatareddy (2021) [7].

**Table 4:** Relationship between personal, social, economic and psychological with their livelihood security

(n=240)

Sl. No.	Independent variables	Correlation co-efficient (r)
1.	Education level	0.083 NS
2.	Land holding	0.373**
3.	Cropping pattern	0.193**
4.	Livestock possession	0.291**
5.	Cosmopolitaness	0.377**
6.	Innovativeness	0.107**
7.	Mass media exposure	0.405**
8.	Extension participation	0.196**
9.	Social participation	-0.004 NS
10.	Level of aspiration	0.134*
11.	Risk orientation	-0.057 NS
12.	Training undergone	0.411**
13.	Willingness in agriculture	0.418**

NS: Non-Significant; \*: Significant at 5% level; \*\*: Significant at 1% level.

The findings in the Table 4 implied that, 10 out of 13 characteristics found to have significant relationship with livelihood security. The personal, socio-economic and psychological characteristics such as land holding, cropping pattern, livestock possession, cosmopolitaness, innovativeness, mass media exposure, extension participation, level of aspiration, training undergone and willingness in agriculture had positive and significant relationship with livelihood security. The possible reason for the above trend might be due to land holding is the major asset which provides economic security to the respondents thereby it leads secured livelihood. 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 adopting the new technologies advocated by the

scientists and project personnel led to higher productivity, profitability fetching higher income and generated higher employment. Higher level of mass media exposure would have facilitated the members to develop habits of gathering more information about the latest technologies of IFS. Level of aspiration and training undergone had positive and significant relationship with livelihood security, the participation in training programmes enhanced the knowledge about IFS due to exposure to different components of IFS and success stories might have contributed to above trend. The respondents might have developed inclination towards IFS due to regular contact with the project personnel, agriculture officers, KVK scientists and farm scientists of agriculture university. 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 (2013) <sup>[4]</sup>, Harshitha *et al.*, (2018) <sup>[2]</sup> and Venkatareddy (2021) <sup>[7]</sup>.

**Table 5:** Multiple regression analysis of personal, social, economic and psychological characteristics of respondents with their livelihood security

Sl. No.	Variables	Regression coefficient (b)	Std. Error of regression co-efficient (SE <sub>b</sub> )	't' value
1.	Education level	-0.026	0.200	-0.129 <sup>NS</sup>
2.	Land holding	0.936	0.325	2.883**
3.	Cropping pattern	1.206	0.323	3.736**
4.	Livestock possession	0.131	0.125	1.055 <sup>NS</sup>
5.	Cosmopolitaness	-0.523	0.314	-1.667 <sup>NS</sup>
6.	Innovativeness	2.114	0.675	3.133**
7.	Mass media exposure	0.159	0.107	1.485 <sup>NS</sup>
8.	Extension participation	0.117	0.037	3.159**
9.	Social participation	-0.093	0.135	-0.690 <sup>NS</sup>
10.	Level of aspiration	0.546	0.274	1.984*
11.	Risk orientation	0.057	0.135	0.423 <sup>NS</sup>
12.	Training undergone	0.320	0.131	2.450*
13.	Willingness in agriculture	-1.555	0.401	-3.875 <sup>NS</sup>

R<sup>2</sup> = 0.6340, F = 15.37\*\*; NS: Non-Significant; \*: Significant at 5% level; \*\*: Significant at 1% level

The contribution of independent variables to the livelihood security of the respondents was assessed and illustrated in the Table 5. The findings conveyed that, six independent variables such as land holding, cropping pattern, innovativeness, extension participation, level of aspiraton, training undergone had contributed significantly towards livelihood security of the respondents. The remaining variables had not contributed significantly towards variability in livelihood security. The R<sup>2</sup> value indicated that all the 13 independent variables had contributed to the tune of 63.40 percent of variation in livelihood security of the respondents. The possible reason with regard to the extent of contribution of independent variables to variation in livelihood security is due to land holding, cropping pattern, innovativeness, extension participation, level of aspiration, training undergone characteristics of respondents were the factors going to influence directly on livelihood security of the respondents. Independent variables have synergic effects to one another, helping each other to have a major extent of contribution towards the livelihood security of farmers.

The results pertaining to economic analysis of IFS components were presented in the Table 6 indicated that, Livestock and Crop component generated 583.64 mandays of employment per annum and Rs. 130553.50 net income to beneficiary farmers. The average gross income of Rs. 191745.50 from both crop and livestock enterprises of IFS against Rs. 14529.00 before implementation of the project. As such, for every one rupee investment under IFS they got Rs. 3.13 rupee income where in BC ratio has been increased to 3.11 from 1.81 in crop component and with respect livestock component BC ratio was found to be enhanced to 3.13 from 1.81. 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 provides regular income through the sale of milk, butter / ghee, egg and manure. Minimum use of off-farm inputs, maximum on-farm inputs and wastes recycling helps to increase and sustain profitability of farm.

**Table 6:** Economic analysis of Integrated Farming System (IFS) components before and after the implementation of project in Tumukuru district (n=240)

Crop Component	Before									After									Change in yield (%)	Change in Income (%)	Emply. Gene. In (Mandays/ac.)	Emply. Gene. of Beneficiary farmers (Mandays)
	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					
Ragi (n1=250)	1.67	6.00	10.02	1450.00	4800.00	8016.00	14529.00	6513.00	1.81	9.00	15.03	1850.00	6500.00	10855.00	27805.50	16950.50	2.56	50.00	91.38	86.00	143.62	
Redgram(n2=50)										2.00	3.34	3500.00	1100.00	1837.00	11690.00	9853.00	6.36			6.00	10.02	
Total						8016.00	14529.00	6513.00	1.81					12692.00	39495.50	26803.50	3.11		171.84		153.64	
Livestock Component	Body live wt. or Ltrs/ sheep or poultry or pig or cow	Price/kg or Ltr	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	Cost	Gross Income (Rs.)	Net Income (Rs.)	B:C Ratio	Change in yield (%)	Change in Income (%)	Emply. Gene. (Mandays)	Emply. Gene. of Beneficiary farmers (Mandays)						
Cow (n1=180)							1600.00	28.00	16500.00	44800.00	28300.00	2.72				210.00						
Sheep (n2=96)							98.00	400.00	12000.00	39200.00	27200.00	3.27				90.00						
Poultry (n3=283)							15.00	150.00	2250.00	2250.00												
Piggery (n4=24)							550.00	120.00	20000.00	66000.00	46000.00	3.30				130.00						
Total									48500.00	152250.00	103750.00	3.14				430.00						
Grand total			8016.00	14529.00	6513.00	1.81			61192.00	191745.50	130553.50	3.13		171.84		583.64						
* Inter crop																						

## 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 40.42 percent from 27.08 percent, out of seven dimensions maximum increase was noticed in employment security (60.15%). The characteristics such as land holding, cropping pattern, livestock possession, cosmopolitaness, innovativeness, mass media exposure, extension participation, level of aspiration, training undergone and willingness in agriculture had positive and significant relationship with livelihood security. The  $R^2$  value indicated that all the 13 independent variables had contributed to the tune of 63.40 percent of variation in livelihood security of the respondents. The findings conveyed that six independent variables such as land holding, cropping pattern, innovativeness, extension participation, level of aspiration, training undergone had contributed significantly towards livelihood security. The  $R^2$  value indicated that all the 13 independent variables had contributed to the tune of 63.40 percent of variation in livelihood security of the respondents. Hence, the concerned development departments shall promote and strengthen the IFS activities to enhance the livelihood security of resource poor farmers. The positive and significantly related characteristics needs to be considered while selecting the farmers for IFS programs to enhance their livelihood security.

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