Development of Scheduled Caste farmers through Integrated Farming System in Bangalore Rural District, India

ABSTRACT

The study was conducted in Bengaluru Rural district of Karnataka State, a total sample of 275 respondents was selected for the study and the data was collected by using pretested structured interview schedule and analyzed using appropriate statistical tools. It was observed that, the livelihood security of the respondents under 'highly satisfied' category was improved from 23.64 per cent from the bench mark data to 38.18 per cent. In 'less satisfied' category it was decreased to 32.73 per cent from 41.82 per cent after implementation of the project. Out of seven dimensions of livelihood security, maximum increase was noticed in employment security (69.84%) followed by ecological security (60.96%), living amenities (52.39%), economic efficiency (51.76 %), coping strategies against stress (45.35%), assets (37.13 %) and social equitability (28.03%) and overall livelihood security increased by 48.17 per cent after implementation of the project. The personal,socio-economic and psychologicalcharacteristics of the beneficiaries; land holding, cropping pattern, livestock possession, innovativeness, mass media exposure, management orientation, level of aspiration, training undergone, participation in development programme, access to extension personnel and access to resources exhibited positive and significant relationship with livelihood security.The R^2 value of 0.324 indicated that all 18 variables had contributed to the tune of 32.40 per cent of variation in Livelihood Security of respondents. Hence, the concerned development departments should promote and strengthen the IFS activities to enhance the livelihood security of resource poor framers. The positive and significantly related characteristics needs to be considered while selecting the farmers for IFS programs to enhance their livelihood security.

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. Small and marginal farmers are the core of the Indian rural economy constituting 85% of the total farming community"(Kumar *et al.*,2020). "Increasing land fragmentation, diminishing natural assets, high costs for external farm inputs, indebtedness and pesticide-related health issues have threatened the livelihoods of many farmfamilies.The small and marginal farmers encounter several challenges and issues. 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.Further, due to limited access to markets and absence of institutions to safeguard the interests.About 58 per cent of rural Indians depend on agriculture for their livelihood and this sector contributes 18.80per cent to the country's GDP"(Roopa and Dinesh,2022). "The smaller share of agriculture in national GDP is getting

distributed among a larger number of people who depend on agriculture for their livelihood and even credit. 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. ThroughIntegrated 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 integrates dairy, poultry, sheep, piggery, fishery, sericulture, agro-forestry and other related enterprises with crop husbandry which increases the overall net income". [11]

In Karnataka, the Scheduled Caste (SC) population comprised of 17.15 per cent and majority of them belongs to small & marginal farmersand 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, piggery,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 respondents practicing Integrated Farming System
3. To know the relationship between personal,socio-economic and psychological characteristics of respondents with their livelihood security
4. To study the economic analysis of Integrated Farming System on development of SC farmers

METHODOLOGY

The study was conducted in purposively selected Bengaluru Rural 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 University of Agricultural Sciences, Bangalore during 2014-15 to 2018-19. Three taluks were selected namely Doddaballapura. DevanahalliandHosakote from Bengaluru Rural district. Two GramaPanchayats from each taluk and three to four villages from each Panchayat were selected based on maximum number of SC farm families. All the farm families having land holding 1 to 5 acres of dryland were considered as beneficiaries (respondents) under the project. Total sample of 275 respondents was purposively selected for the study. Data was collected using structured interview schedule and analyzed using mean, percentage, standard deviation and correlation coefficient.

RESULTS AND DISCUSSION

It was observed in Table 1 that,"the majority respondents belonged to high category of cropping pattern and livestock possession. The above trend is noticed since all the respondents received inputs like improved seeds, planting material poultry birds and one of thelivestock components like cow/sheeps/ pigletsbased on their needs through project and got optimum production, productivity and net income". [11] The study results were supported by the findings of Mamathalakshmi (2013),Harshitha *et.al.*(2018)and Shwetha&Shivalingiah(2019).

"The study conferred that respondents belonged to medium category of education, extension participation, social participation, management orientation, risk orientation, participation in development programmes, training undergone and willingness towards IFS. This finding can be explained on the basis of the fact that the the rural social environment was the major cause for such trend. As the rural people are still traditional bound, they don't prefer to continue their children education, the distance of higher educational institutions from villages also might have prevented the parents toprovide higher education to their children. Participation in extension activities and development programmes provided opportunities for them to improve their knowledge about IFS technologies and to be rational in decision making and in adoption of new technologies. Nowadays,villages have more contacts with social organizations such as gramapanchayat, talukpanchayat, farmer co-operatives, Rural development NGOs etc., might have made them to take part in social activities". [11]Medium levels ofrisk orientation would be exploiting the potentialities of IFS enterprises. Such individuals would be possessing more entrepreneurial characteristics like innovativeness, achievement motivation etc.These individuals will be very much critical and cautious in understanding different aspects of a technology which directly or indirectly help them to acquire different components essential for better management. Through the project ample of opportunities were given to the respondents to undergo training on different aspects of IFS.The results of the present study are in linewith the findings of Sujay Kumar (2012), Mamathalakshmi (2013) Shwetha(2019)andVenkatareddy(2021).

The present study observed that low category of land holding, cosmopoliteness, innovativeness, scientific orientation, level of aspiration and access to resource. It could be due to the fact that the village does not had better road connectivity and transport facilities, which enabled the respondents not to visit city to sell their produce, to purchase inputs, to meet the

extension personnel of developmental departments / project staff to seek advice or to derive benefits as well as for domestic purposes. Low level of innovativeness might be due to the fact that most of the respondents were not aware about importance of new practices, as they do not willing to take risks associated with new ideas. The majority of respondents had small size land holdings, which were not so fertile, they were not getting expected yield and income from agriculture. Cumulative effect of all these factors might have made the respondents which results in low level of aspiration. The possible reason is majority of the respondents belongs to marginal category of land holding due to fragmentation of landbeceauseof predominance of nuclear families. The above mentioned findingsare in consonance with the finding of Mamathalakshmi (2013),Harshitha (2018)and Shwetha&Shivalingiah(2019).

A critical appraisal of Table 2 indicated that, the livelihood security of respondents in 'less satisfied category' decreased to 32.73 per cent from 41.82 per cent and in 'highly satisfied category' increased to 38.18 per cent from 23.64 per cent after implementation of the project. "An integrated farming system fulfils the multiple objectives of making farmers self-sufficient by ensuring the family members a balance diet, improving the standard of living through maximizing the total net returns and provide more employment, minimizing the risk and uncertainties and keeping harmony with environment.Thus, this system of farming is very promising for improving satisfacrtion level and secured livelihood of the respondents". Harshitha *et al*., (2018) and Chaithra &Shivalingiah(2023).

The data depicted in Table 3 indicatedthat, the improvement in different dimensions of livelihood security after the implementation of the project in Bengaluru Rural district. Out of seven dimensions, maximum increase was noticed in employment security (69.84 %) followed by ecological security (60.96 %), living amenities (52.39 %), economic efficiency (51.76 %), coping strategies against stress (45.35 %), assets (37.13 %) and social equitability (28.03 %).Whereas overall livelihood security increased by 48.17 per cent after implementation of the IFS project. Practicing IFS reduced the production cost of components through input recycling from the by-products of allied enterprises and increased soil fertility and productivity per unit area by virtue of intensification of crops and allied enterprises. The recycling of wastes for production helps to avoid piling of wastes and consequent pollution. Further, because of higher net returns to land and labour resources and regular stable income through the sale of products like egg, milk, vegetables, ghee etc. IFS enabled farmers to achieve employment, ecological, economic security as well as better living amenities.The findings are in accordance with the findings reported byMamathalakshmi (2013), Gopala (2015) and Venkatareddy(2021).

Relationship between personal,socio-economic and psychological characteristics of respondents with their livelihood security.

The findings in the Table 4 implied that, 11 out of 18 characteristics found to have significant relationship with livelihood security. Thepersonal, socio-economic and psychological characteristics such as land holding, cropping pattern, livestock possession, innovativeness, mass media exposure, management orientation, level of aspiration, training undergone, participation in development

programme, access to extensional 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 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 generatedemployment. Higher level of mass media exposure would facilitate the members to develop habits of gathering more information about the improved IFS activities. Level of aspiration and training undergone had positive and significant relationship with livelihood security the possible reason for such result might be due to the reason, respondents spent greater amount of time in IFS to fulfil their aspirations such as multiple cropping, diary, piggery, sheep rearingand poultry etc. The participation in trainingprogrammes enhanced the knowledge about IFS due to exposure to different components ofIFS in each of the training programmes, respondents directlyinfluenced by the training undergone. Regular contact with extension personnel, agriculture officers, scientists ofUAS,Bangaloreand hence the respondents might have developed inclination towards IFS.Being an IFS farmer effective utilization ofavailable resources leads to higher productivity, profitability, employment generation and farmincome. The findings are in conformity with the results obtained by Harshitha *et al*., (2018),Sujay Kumar (2018),Shwetha&Shivalingiah(2019) andVenkatareddy(2021).

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

(n=275)

Sl. No.	Characteristics	Category	Number	Per cent
1.	Education	Low	62	22.55
		Medium	158	57.45
		High	55	20.00
2.	Land holding	Marginal	116	42.18
		Small	77	28.00
		Big	82	29.82
3.	Cropping pattern	Low	88	32.00
		Medium	90	32.73
		High	97	35.27
4.	Livestock possession	Low	87	31.64

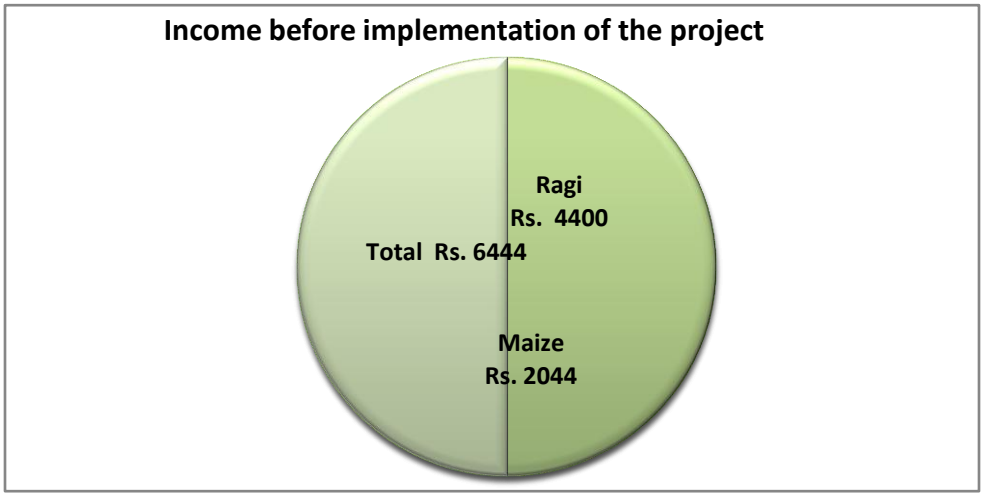
		Medium	92	33.45
		High	96	34.91
5.	Cosmopoliteness	Low	93	33.82
		Medium	91	33.09
		High	91	33.09
6.	Innovativeness	Low	101	36.73
		Medium	92	33.45
		High	82	29.82
7.	Mass media exposure	Low	84	30.55
		Medium	113	41.09
		High	78	28.36
8.	Extension participation	Low	79	28.73
		Medium	110	40.00
		High	86	31.27
9.	Social participation	Low	78	28.36
		Medium	104	37.82
		High	93	33.82
10.	Scientific orientation	Low	103	37.45
		Medium	89	32.36
		High	83	30.18
11.	Management orientation	Low	80	29.09
		Medium	102	37.09
		High	93	33.82
12.	Level of aspiration	Low	108	39.27
		Medium	80	29.09
		High	87	31.64
13.	Risk orientation	Low	75	27.27
		Medium	108	39.27
		High	92	33.45
14.	Training undergone	Low	69	25.09
		Medium	153	55.64
		High	53	19.27
15.	Participation in the developmental programmes	Low	64	23.27
		Medium	83	30.18
		High	128	46.55
16.	Willingness towards IFS	Low	90	32.73
		Medium	102	37.09

		High	83	30.18
17.	Access to extension personnel	Low	82	29.82
		Medium	98	35.64
		High	95	34.55
18.	Access to resources	Low	101	36.73
		Medium	88	32.00
		High	86	31.27

Table 2: Distribution of SC farmers practicing IFS according to their livelihood security

(n=275)

Category	Before		After		Change in Per cent
	Number	Per cent	Number	Per cent	
Less satisfied	115	41.82	90	32.73	-9.09
Satisfied	95	34.55	80	29.09	-5.46
Highly Satisfied	65	23.64	105	38.18	14.54
Total	**275**	**100.00**	**275**	**100.00**	



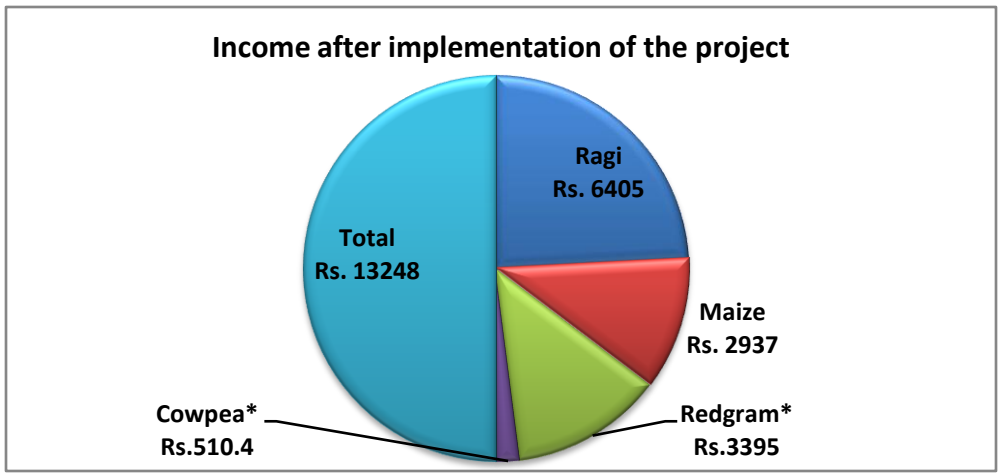


Fig. 1: Income of IFS farmers from crop component before and after implementation of the IFS project

Table 3:Dimension-wise analysis of livelihood security

(n =275)

SI. No.	Livelihood Security Dimensions	Scores		increase in %
		Before	After	
1	Assets	878	1204	37.13
2	Living amenities	920	1402	52.39
3	Economic efficiency	427	648	51.76
4	Ecological security	543	874	60.96
5	Social equitability	717	918	28.03
6	Coping strategies against stress	624	907	45.35
7	Employment security	746	1267	69.84
	Overall Livelihood Security	4855	7220	48.71

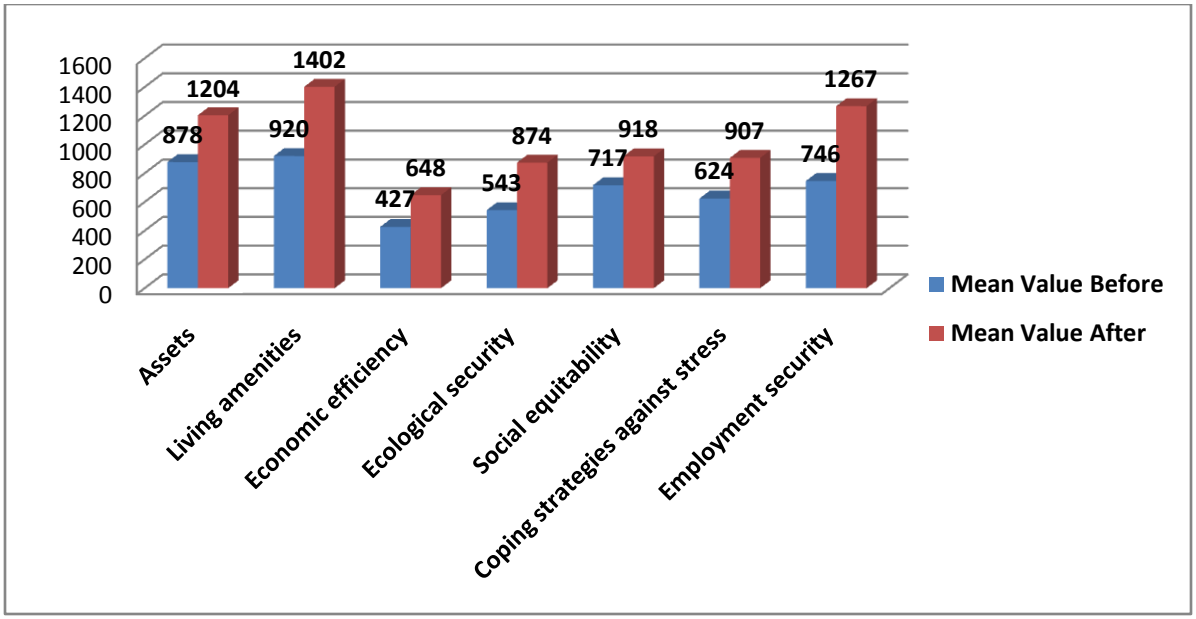


Fig. 2: Dimension-wise livelihood security improvement before and after the implementation of project

Table 4: Relationship between of personal,socio-economic and psychological characteristicsrespondents with theirlivelihood security

(n=275)

Sl. No.	Independent variables	Correlation co-efficient (r)
1.	Education	0.105^{NS}
2.	Land holding	0.252^{**}
3.	Cropping pattern	0.152^{*}
4.	Livestock possession	0.193^{**}
5.	Cosmopoliteness	0.016^{NS}
6.	Innovativeness	0.225^{**}
7.	Mass media exposure	0.235^{**}
8.	Extension participation	-0.023^{NS}
9.	Social participation	-0.026^{NS}
10.	Scientific orientation	0.110^{NS}
11.	Management orientation	0.128^{*}
12.	Level of aspiration	-0.213^{**}
13.	Risk orientation	-0.094^{NS}
14.	Training undergone	0.197^{**}
15.	Participation in the developmental programme	0.121^{*}
16.	Willingness towards IFS	0.031^{NS}
17.	Access to extension personnel	0.177^{**}
18.	Access to resources	0.167^{**}

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

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

(n=275)

Sl. No	Variables	Regression coefficient (b)	Std. Error of regression co-efficient (SE_b)	't' value
1	Education	0.064	0.142	0.448
2	Land holding	0.019	0.067	0.289
3	Cropping pattern	0.080	0.078	1.019
4	Livestock possession	0.261	0.110	2.375*
5	Cosmopoliteness	-0.147	0.074	-2.001*
6	Innovativeness	0.233	0.103	2.262*
7	Mass media exposure	0.185	0.242	0.763
8	Extension participation	-0.116	0.120	-0.0971
9	Social participation	-0.494	0.171	-2.892**
10	Scientific orientation	-0.008	0.146	-0.053
11	Management orientation	0.203	0.089	2.290*
12	Level of aspiration	0.296	0.143	2.062*
13	Risk orientation	0.101	0.094	1.075
14	Training undergone	0.393	0.251	1.563
15	Participation in the developmental programme	0.392	0.333	1.176
16	Willingness towards IFS	0.022	0.029	0.778
17	Access to extension personnel	-0.047	0.080	-0.583
18	Access to resources	0.325	0.457	0.711

R^2= 0.324, F= 4.569 NS: Non-Significant; *: Significant at 5% level;
**: Significant at 1% level.

Table: 5: Economic analysis of Integrated Farming System (IFS) components before and after implementation of project in Bengaluru Rural district

(N=275)

		Before								After											
Crop Component	**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=180)	0.70	6.00	4.20	1600.00	6000.00	5200.00	9600.00	4400.00	**1.85**	8.50	5.95	1900.00	7000.00	4900.00	11305.00	6405.00	**2.31**	**41.67**	**17.76**	88.00	61.60
Maize (n2=95)	0.44	6.50	2.86	1310.00	3868.00	1701.92	3746.60	2044.68	**2.20**	8.00	3.52	1400.00	4523.00	1990.12	4928.00	2937.88	**2.48**	**23.08**	**31.53**	64.00	28.16
Redgram*										1.50	1.05	3900.00	1000.00	700.00	4095.00	3395.00	**5.85**			5.00	3.50
Cowpea*										0.60	0.26	3600.00	1000.00	440.00	950.40	510.40	**2.16**			5.00	2.20
Total						**6901.92**	**13346.60**	**6444.68**	**1.93**					**8030.12**	**21278.40**	**13248.28**	**2.65**		**59.43**		**95.46**
Livestock Component	**Bodylivewt.or Ltrs/sheepor poultryorpigor cow**		**Price/kg or Ltr**		**Cost**		**Gross Income (Rs.)**	**Net Incom e (Rs.)**	**B:C Ratio**	**Body live wt. or Ltrs/ sheep or poultryorpigorcow**		**Price/kgorLtr**		**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=223)										1600.00		28.00		18000.00	44800.00	26800.00	**2.49**				**210.00**
Sheep (n2=49)										110.00		400.00		10000.00	44000.00	34000.00	**4.40**				90.00
Poultry*(n3=186)										10.00		150.00			1500.00	1500.00					
Piggery (n4=3)										**150.00**		**120.00**		**10000.00**	**18000.00**	**8000.00**	**1.80**				**130.00**
Total														**38000.00**	**108300.00**	**70300.00**	**2.85**				**430.00**
Grand total						**6901.92**	**13346.60**	**6444.68**	**1.93**					**46030.12**	**129578.40**	**83548.28**	**2.82**		**59.43**		**525.46**
* Intercrop																					

Extent of contribution of personal,socio-economic and psychological characteristics to Livelihood Security of respondents

The regression test was used to ascertain the extent of contribution of independent variables to the livelihood security of respondents and the results are presented in Table 5 revealed that, social participationhad significantly contributed at 0.01 per cent level of probability and variables such as livestock possession, cosmopoliteness, innovativeness, management orientation and level of aspiration significantly contributed at 0.05 per cent level of probability. The R^2 value of 0.324 indicated that all 18 variables had contributed to the tune of 32.40 per cent of variation in livelihood security of respondents.

Data presented in Table 5 indicated that, after implementation of the project, thecow,sheep, poultry and piggery bird as livestock enterprise and cowpea and Redgram as intercrop cultivation in their farms.The average yield of Ragi increased by 41.67 per cent after implementation of project. Livestock component generates average net income of Rs. 70,300 and generates 430 mandays/annum employment to beneficiary farmers.The average gross income of Rs. 1,29,578.40 from both crop and livestock enterprises of IFS against Rs. 13,346.60 before implementation of the project. In total they could realize about Rs. 83,548.28 net profit by adopting IFS in their farm. As such, for every one rupee investment under IFS they are getting 2.82 rupeeincome.

CONCLUSION

Based on the findings it can be concluded that, the results revealed that the livelihood security improved from less satisfied to highly satisfied level, out of seven dimensions of livelihood security maximum increase was noticed in employment security. In total they could realize about Rs. 83,548.28 net profit by adopting IFS in their farm, for every one rupee investment under IFS they are getting 2.82 rupee income.The characteristics such as land holding, cropping pattern, livestock possession, innovativeness, mass media exposure, management orientation, level of aspiration, training undergone, participation in developmental programmes, access to extension personnel and access to resources exhibited positive and significant relationship with livelihood security of respondents.Hence, the concerned development departments shall promote and strengthen the IFS activities to enhance the livelihood security of resource poor framers. 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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