Contribution of Integrated Farming System (IFS) Units Towards Household Income in Kerala

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ABSTRACT

From an economic point of view, combining various components in the same unit helps to diversify farmers' income. An attempt was made to determine the contribution of various components, adopted in an IFS unit, to the annual household income among the IFS units of Kerala during 2022. In this study, total annual household income was computed by summing up the gross income from all the on-farm sources. The study revealed that 52.78 per cent of respondents were found in the low-income category, followed by one-third in the medium-income category. Among the selected components, the contribution of income from the crop component, dairy component, and poultry component, was found to be low to medium, while the trend in income generation from fish component was from medium to low. In the case of apiculture and mushroom components, medium to high-income generation was also noticed. It was also found that farm size, experience in farming, economic motivation, training undergone, and herd size were positively correlated with the total farm income of households.

INTRODUCTION

Kerala is notable for having a variety of microenvironments that may support different kinds of agriculture and related activities. The unique features of Kerala agriculture are the homestead system of cultivation, shrinkage of area, prevalence of cash crops and dominance of marginal holders (Jeromi, 2007). However, the economic situation of the state has been confronted with numerous hurdles in the past few years. Kerala is highly prone to various natural disasters like cyclones, droughts, floods and landslides (GoK, 2020). The unexpected crisis due to Covid-19 pandemic has also hit the state very hard. Any agricultural production becomes sustainable only when it fetches due economic benefits to the farmer. In addition to improve production related aspects, the current emphasis of national agricultural policies focuses on raising farmer's income also (Nain et al., 2019; Tiwari et al., 2023).

Since the risk of mono-cropping is increasing, IFS is a feasible choice to ensure sustainable income as well as nutritional security to farm families. It also enables maximum productivity per unit area and allows for maximum profit while maintaining ecological and socioeconomic balance (Rejula et al., 2017; Nair et al., 2019). Every component of IFS has the potential to influence the livelihood security and economic condition of the family (Meshram et al., 2019). By realizing these facts, several programmes have been introduced in Kerala by various formal institutions to promote the IFS concept, thereby enhancing the productivity and profitability of farmers. The Integrated Farming System Research Station (IFSRS) of Kerala Agricultural University has developed many IFS models and has also won national recognition for its activities. These models have also been included in the state plan for popularization at the panchayat level. According to the Tenth Agriculture Census 2015-16 of Kerala, the average size of holdings has declined to

0.18 hectares in 2015-16 as compared to 0.22 hectares in 2010-11, which is quite modest when compared with other states. The official figures show that 96.7 per cent of the total number of landholdings belong to marginal farmers (GoK, 2019). In this context, IFSRS Karamana has developed four IFS models of 0.20 ha each. Among these four models, Kerala homestead gardens are widely accepted as a viable land use system in the state (John, 2014). As a result of these initiatives, the number of farmers who have shifted from monocropping systems to IFS has increased to a certain extent in the last few years. Based on the differences in components present in a unit, several IFS models can be seen in Kerala. Each model is unique in terms of productivity as well as economic returns. The income obtained from each IFS unit depends on the components adopted in it. In this context, an attempt was made to analyse the component-wise contribution towards annual household income among the IFS adopted farmers.

METHODOLOGY

The study was conducted purposively in Kerala. To get a complete understanding of the state, three districts were selected randomly, one each from southern, central and northern part of Kerala. The selected districts were Kollam, Thrissur and Kannur respectively. From each selected district, two Agro Ecological Units (AEUs) were selected and from each AEUs two panchayats were randomly selected. A list of farmers who had adopted IFS with dairying as one of the components was prepared with the help of officials of ATMA, KVK, Department of Agriculture, Department of Animal Husbandary, Department of Dairy Development and Other Local Leaders in selected panchayat. From the list, randomly 15 farmers were chosen from each selected panchayat and in total 180 IFS farmers were selected for the study.

Income refers to the total earnings of the IFS farmer's household in a year accrued from farm activities and other sources, represented generally in monetary terms. Total annual household income was estimated in this study by adding the gross income from all on-farm sources. By conducting PRA techniques, focussed group discussion with experts in the relevant field and through secondary data collection, different IFS components had been identified in the IFS units of Kerala. They were categorized as major components and supporting components. Only six, out of the nine identified components, were giving financial assistance to farmers. Those components were dairy, crop, poultry, fisheries, mushroom and apiculture. Component-wise net income was computed separately to know about the contribution of each component to their annual household income. A pretested schedule was used to obtain data on those components. Respondents were categorized in to three categories namely, low, medium and high-income category based on their cumulative square root frequency. To know the relationship between socio-economic profile characteristics of IFS farmers and their total farm income, correlation analysis was conducted.

RESULTS AND DISCUSSION

From an economic point of view, combining various components in the same unit helps to diversify farmer's income.

An attempt was made to determine the contribution of various components to the annual household income of IFS farmers.

Categorization of IFS farmers based on the annual income from various IFS components

From the study it was found that among the nine identified components only six components had contributed to their household farm income. There was no significant contribution noticed from other components towards annual income in any of the units. The table given below show the distribution of farmers based on their component wise contribution to annual household income (Indian rupee).

From Table 1, it was evident that among the selected components, the contribution of income from the crop component, dairy component and poultry component was found to be low to medium. Whereas income from apiculture and mushroom was from medium to high. Different types of crops were seen in IFS units of Kerala, among these, the main income yielding crops were rice, tubers, fruit crops, pulses, oil seeds and plantation crops. In the study area, most of the units had vegetable cultivation. The products were mainly utilized for household consumption rather than marketing purposes. According to John (2014), in the homestead systems of Kerala, plants were used for various purposes, such as wood, food and so on, which helps to reduce outside purchase to a greater extent. This might be a reason for low income. Since they cultivate crops for maintaining the food security of their families and crop wastes were fed to different components, the IFS farmers were generally following organic cultivation practices, which affected pest and disease incidence and productivity and therefore resulted in low yields. Crop loss due to climate related issues can also be considered a reason. Apart from these, the hike in fertilizer prices, as a post-Covid impact, increased their cost of cultivation and reduced the profit from crop components.

In the case of dairy, more than half (58.89%) of the dairy farmers were getting low income, from their dairy units. District wise data also follows the same trend. According to the latest Livestock Census Report, 2019, crossbred cattle produced 93.82 per cent of the milk in Kerala (GoK, 2020). In the study area, the majority of the dairy farmers had small herd size and they were selling their milk to dairy cooperative societies (MILMA). As an impact of Covid-19 and lockdown, the price of feed was hiked, but the price of milk has not changed significantly over the past three years (Sudhish, 2022). Sreeram et al., (2018) had conducted a study in Kerala and found that hiked price of feeds and non-remunerative price for milk were the top ranked constraints associated with the dairy sector in Kerala. The finding was similar to that of Suraj (2021), who had conducted a study among dairy entrepreneurs and found that 77.05 per cent of the dairy entrepreneurs in Kerala fell into the low income level.

With respect to poultry component as well, the majority (51.26%) of the respondents belonged to the low income category, whereas for fisheries component most of them were in medium (47.37%) category. Since the majority of the IFS farmers were following backyard poultry, a major portion of the eggs were utilized in the home itself. Most of them were not following the proper diet balance, which also affected productivity. These reasons

Table 1. Component wise annual farm income from IFS units

Components	Kollam (%)	Thrissur (%)	Kannur (%)	Total (%)
Crop component (n=180)				
Low (<175016)	51.67	55.00	58.33	55.00
Medium (175016-499903)	33.33	31.67	25.00	30.00
High (>499903)	15.00	13.33	16.67	15.00
Total	100	100	100	100
Dairy component (n=180)				
Low (<79232)	58.33	56.67	61.67	58.89
Medium (79232-148261)	30.00	33.33	21.66	28.34
High (>148261)	11.67	10.00	16.67	12.77
Total	100	100	100	100
Poultry component (n=158)				
Low (<2217)	42.00	51.92	58.93	51.26
Medium (2217-5571)	34.00	34.62	21.43	29.75
High (>5571)	24.00	13.46	19.64	18.99
Total	100	100	100	100
Fisheries component (n=95)				
Low (<368456)	35.48	31.25	25.00	30.53
Medium (368456-529279)	48.39	40.63	53.13	47.37
High (>529279)	16.13	28.12	21.87	22.10
Total	100	100	100	100
Apiculture component (n=55)				
Low (<43523)	20.00	18.75	25.00	21.82
Medium (43523-77466)	53.33	43.75	45.83	47.27
High (>77466)	26.67	37.50	29.17	30.91
Total	100	100	100	100
Mushroom component (n=11)				
Low (<27320)	50.00	0	14.29	18.18
Medium (27320-31190)	50.00	50.00	57.14	54.55
High (>31190)	0	50.00	28.57	27.27
Total	100	100	100	100

might have resulted in low income from poultry components. The findings were on par with that of Kumar et al., (2013). They found that the average flock size reported in villages of the northern zone of Kerala was 5.62 and discovered that as high as 52.15 per cent of the eggs and 59.38 per cent of the cockerels produced are consumed at home. In case of fisheries component most of the respondents were not following the scientific fish production and management technologies. As there were no regional procurement centers to collect fish directly from farmers, they were having trouble in marketing their products. As majority of the farmers depended on the local market for selling their product, they were highly susceptible to price fluctuations. Low adoption of processing technologies also made the situation difficult. In Kerala, during the post-monsoon season, fish are generally sold at very low prices, whereas retail prices skyrocket during times of recession (Salim et al., 2017)

In the case of apiculture and mushroom components, medium to high income generation was noticed. Even though the number of farmers who had adopted these two components were relatively low, the majority of the adopted farmers were getting a remunerative income when compared to other components. Even though the farmers who adopted apiculture were facing a lot of difficulties, the demand for honey was still very high, so this helped them to earn a sustainable income. The result emphasized that more

programmes like training, awareness classes, field visits etc. should be conducted to attract more farmers to these sectors, through which the income from IFS units can be increased.

Categorization of IFS farmers based on their overall annual farm income

It is clear from Table 2 that 52.78 per cent of the respondents were found in the low total income category. Same pattern was visible in all districts. According to the findings of Chandran and Chakravarty (2022), in the IFS units of Kerala, the rate of adoption of identified components were found to be low and none of the units possessed all the identified components. Among the components, least adoption was noticed for mushroom and apiculture. Since crop and dairy components were found to be the dominant components in all the selected systems, the high cost of cultivation associated with these components affected the profitability. Besides these, frequent crop failures due to unexpected climate change also affected productivity and profitability. Furthermore, the attitude of farmers towards IFS is also important. Some of the farmers considered IFS as an option to ensure family's food security. For such farmers, income generation is secondary. They consumed the majority of the product in their own homes and sold only rest of the quantity. On such farms, the adoption of scientific management practices might be

Table 2. Overall annual income from adopted components.

Categories (Total annual farm income)	Kollam (%)	Thrissur (%)	Kannur (%)	Total (%) (n=180)
Low (<361254)	56.67	48.33	53.34	52.78
Medium (361254-823059)	31.67	35.00	33.33	33.33
High (>823059)	11.66	16.67	13.33	13.89
Total	100	100	100	100

very low, as high investment and low income might affect their financial conditions.

The hiked price for feeds, fertilizers and other inputs affected the economical balance of the system severely. Since IFS contains several components, the cost of production for each component was increased due to the hiked price of various inputs, especially during the post Covid situation. Some of the challenges necessitate quick action from government level, such as reducing the skyrocketing cost of inputs, bringing scientific pricing of various farm products, increasing availability and supply of quality inputs and establishing more regional government procurement centres. With respect to crop component, diversification techniques can be promoted among these units, as several researchers have indicated that these practices were more likely to be used by farmers, who have suffered losses in cultivation (because of climate change issues, environmental stress and so on), to protect themselves against further losses (Raghuvanshi & Ansari, 2020; Dupdal et al., 2021). Ghouse & Hassan (2020) found that crop diversification was positively correlated with risk orientation, economic motivation as well as innovativeness of farmers and was a viable option to increase farmer's income and ensure sustainability. These results were in line with those of Priscilla et al., (2021), who also found that crop diversification can significantly influence the income of farm families.

Factors associated with total farm income of households

Correlation analysis was conducted to understand the relationship between socio-economic profile of farmers and total annual farm income. The results were given below (Table 3).

From the Table 3, it was found that, farm size, experience in farming and economic motivation were positively correlated with total farm income at 1% level of significance and training undergone as well as herd size at 5% level of significance. The existence of IFS depends significantly on the size of the farm because it contains several components. As farm size increases the chances for the adoption of various components as well as the expansion of existing units also increases, which can improve the profit. A study conducted by Ponnusamy & Devi (2017) in two districts of Tamil Nadu found that, landholding was a key element in keeping different agricultural enterprises in an IFS unit. Farming experiences aid the farmers to identify the threats and opportunities in advance, which enables them to adopt better strategies in their unit to increase production and subsequently profitability. Experiences also help in the improvement of their knowledge, skills and confidence, which contribute to the effective performance of diverse activities. Attending trainings help them to update their knowledge, skills and earn more. High economic motivation drives

Table 3. Correlation coefficient of total income with socio economic characteristics of farmers

Independent Variables	Correlation Coefficient ('r')
Age	-0.055
Education	0.026
Family size	-0.019
Occupation	0.113
Farm size	0.456**
Experience in farming	0.256**
Mass media exposure	0.108
Extension agency contact	0.120
Participation in extension programmes	0.112
Market orientation	0.059
Irrigation potential	-0.034
Economic motivation	0.228**
Innovativeness	0.061
Risk orientation	0.118
Social participation	0.097
Training undergone	0.183*
Awareness towards IFS	0.062
Herd size	0.190*

*Significant at 5 percent level, ** Significant at 1 per cent level

them to adopt more components and more scientific practices to maximize their profit. In a dairy based IFS unit, herd size has a significant role in the net farm income. Livestock is a vital aspect of IFS which provides income on a daily/weekly basis. Aside from income generation, dairy is an important connecting link for integrating various components in a unit. Most of the farmers in the study area had small herd size, which reflected in their profitability also.

CONCLUSION

The rate of adoption of available components was noticed as low in selected IFS units. It has reflected in the annual household income as well. From an economic point of view, the existence of each unit directly related to the profit obtain from each component. For establishing and maintaining some components farmers are facing certain constraints. Hence, more effort should be taken to mitigate those constraints faced by the farmers for improving productivity and profitability from those components. As the adoption of some components like apiculture and mushroom was found to be low, more effort is needed for conducting more training and designing new programmes with adequate incentive structures that would accelerate the adoption of least adopted income generating components at farm level, which can influence the overall expansion and profitability of each unit.

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