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# KVK INTERVENTIONS FOR SUSTAINABILITY OF INTEGRATED FARMING SYSTEM MODELS IN DHARWAD DISTRICT OF KARNATAKA INDIA

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**ABSTRACT**

Farmers from Dharwad district of Karnataka, India, faces significant agricultural challenges, including soil nutrient deficiencies, unpredictable rainfall patterns, and socio-economic disparities among farmers. Practising Integrated Farming System (IFS) helps the farmers to manage these problems to a considerable extent. This study evaluates the role of Integrated Farming System (IFS) models in addressing these challenges and enhancing farmer livelihoods. Data were collected from 80 farmers engaged in IFS practices, supported by interventions from Krishi Vigyan Kendra (KVK). Socio-economic characteristics, landholding patterns, and income levels were analyzed over two periods, 2019-20 and 2022-23. Results showed a substantial increase in the average net income, with a mean percent growth of 141.92%, highlighting the economic benefits of IFS adoption. Positive correlations between education, landholding size, and income emphasized the importance of knowledge and resource accessibility. Despite overall progress, disparities in income growth across farmer's underscore the need for targeted interventions for smallholders. KVK initiatives, including training, demonstrations, consultancy and financial support, played a critical role in IFS adoption. The study concludes that farmer tailored and inclusive strategies are essential to scale IFS models effectively, ensuring sustainable agricultural development and equitable growth for farming communities.

***Key words*:** Integrated Farming System, Livelihoods, Interventions, Sustainable, Socio-economic.

## Introduction

Dharwad district in western Karnataka is a significant agricultural producer due to its diverse agro-climatic conditions and farming practices. The district's geography supports the cultivation of various crops, contributing to the state's agricultural economy. However, Dharwad faces numerous challenges, including soil nutrient deficiencies, which impact crop yields and soil health, and the vulnerability to inconsistent rainfall patterns (Srinivasa rao *et al.*, 2021). These uncertainties further exacerbate the challenges faced by farmers in maintaining stable agricultural outputs. The socio-economic landscape of the district also presents challenges, with small to medium landholders having limited access to irrigation, modern technology, and financial resources (Das *et al.*, 2024). This restricts their ability to adopt advanced agricultural practices or diversify their farming systems (Saha *et al.*, 2024). Socio-economic disparities also result in unequal access to opportunities and support, leaving marginal farmers particularly disadvantaged. To address these challenges, there is a need to optimize resource use and enhance productivity, ensuring sustainable livelihoods for farmers in Dharwad. Youth involvement in agriculture is crucial for driving innovation and ensuring sustainable farming practices, as young farmers bring fresh perspectives, technological adaptability, and energy to modernize agricultural systems (Sai *et al.*, 2024). Strategies such as improving soil health through nutrient management, promoting efficient water-use practices, and introducing resilient farming models like the Integrated Farming System (IFS) are essential (Walia & Kaur, 2023). By addressing these issues holistically, the district can

unlock its agricultural potential, reduce vulnerability to external shocks, and support the economic well-being of its farming communities.

The Integrated Farming System (IFS) is a sustainable solution for farmers facing challenges such as unpredictable weather patterns, market volatility, and resource scarcity (Meena *et al.*, 2023). IFS incorporates various agricultural components into a single system, promoting a holistic approach to farming that maximizes resource efficiency. This diversification of activities increases farm productivity by optimizing land, water, and labor use, and enhances resilience against climatic and market uncertainties.IFS emphasizes the recycling of resources within the farming system, reducing waste and the need for external inputs like chemical fertilizers and pesticides. This not only lowers production costs but also reduces the environmental footprint of farming, contributing to long-term sustainability (Satapathy *et al.*, 2021). It reduces dependency on monoculture systems, which are often vulnerable to pests, diseases, and price volatility. In regions like Dharwad, targeted interventions from organizations like Krishi Vigyan Kendra (KVK) have greatly facilitated the adoption of IFS models. These interventions have conducted capacity-building programs, organized demonstrations of modern technologies, and provided financial support for resource optimization (Kumari *et al.*, 2024). By educating farmers on advanced farming practices and techniques, KVK has increased the adoption rate of IFS and improved farm productivity and profitability (Meena *et al.*, 2020). However, the success of IFS adoption depends on understanding the socio-economic characteristics, landholding patterns, and

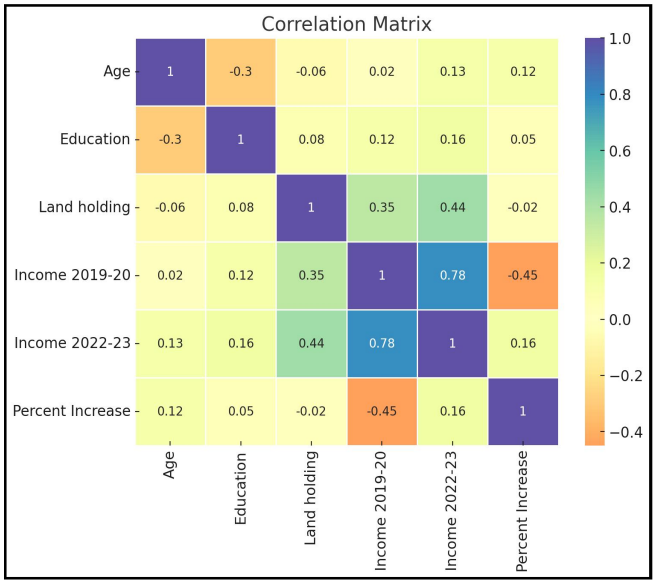


**Fig. 1:** Correlation matrix of income with independent variables of IFS farmer respondents of Dharwad district (n=80).

educational backgrounds of farmers. Tailoring interventions to suit local farmers' specific needs and circumstances is crucial for maximizing the benefits of IFS.In Dharwad district, family farming, supported by Krishi Vigyan Kendra (KVK) interventions and Integrated Farming System (IFS) models, has been central to optimizing resource use, enhancing productivity, and addressing socio-economic disparities among farming households (Suman *et al.*, 2025). Addressing these variables can improve farm livelihoods, promote environmental sustainability, and contribute to rural development in Dharwad and beyond. This article aims to analyze the socio-economic factors influencing the adoption of IFS in Dharwad and evaluate its impact on farmers' incomes over time. By identifying key trends and disparities, the study seeks to provide insights for designing equitable and effective agricultural policies that support sustainable farming practices in the region.

## Materials and Methods

The study was conducted in the Dharwad district of Karnataka, India, recognized for its diverse agro-climatic conditions and reliance on rainfed agriculture, which supports various cropping systems and socio-economic settings. Data were collected from 80 farmers who had adopted the Integrated Farming System (IFS) model, using a structured questionnaire to capture socio-economic characteristics, landholding patterns, educational levels, and income details. Key variables, such as age, years of schooling, and farm size, were documented, along with net incomes for 2019-20 and 2022-23, to evaluate changes over time. A purposive sampling method was employed to select participants engaged with Krishi Vigyan Kendra (KVK) interventions, ensuring a representative sample of those utilizing sustainable farming techniques. Descriptive statistics, including means, standard deviations, and percentiles, were computed to summarize the socio-economic characteristics of respondents, while a paired sample t-test was used to compare net incomes over the two periods, with percent changes in income calculated to assess the impact of IFS on farm profitability. Correlation analysis was performed to explore relationships between key variables, such as education, landholding size, and income, with a correlation matrix developed to identify significant trends influencing IFS adoption and success. KVK interventions, which were central to promoting IFS adoption, included capacity-building programs on sustainable farming practices, on-field demonstrations of IFS benefits such as resource recycling and diversification, and financial support to implement IFS components like livestock integration, crop diversification, and water management systems. Ethical

**Table 1:** Descriptive analysis of independent variables of IFS farmer respondents of Dharwad district (n=80).

| Variable | Mean | Std. Deviation | Minimum | 25th Percentile | Median | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|
| **Age (Years)** | 42.95 | 12.22 | 20.0 | 35.0 | 42.0 | 51.25 | 85.0 |
| **Education (Years)** | 10.69 | 3.87 | 1.0 | 8.75 | 12.0 | 13.5 | 18.0 |
| **Landholding (Acres)** | 10.58 | 8.00 | 1.0 | 5.0 | 10.0 | 14.0 | 40.0 |

guidelines were followed, with informed consent obtained from all participants, and data anonymized to ensure confidentiality.

## Result and Discussion

Data presented in Table 1, provided significant insights into the socio-economic and demographic characteristics of Integrated Farming System (IFS) farmers in the Dharwad district. The average age of the farmers was 42.95 years, with a standard deviation of 12.22 years, indicating a moderately diverse age group. The ages ranged from 20 to 85 years, and the median age was 42 years. This suggested that most farmers were in their productive years, actively contributing to agricultural activities. The dominance of middle-aged farmers indicated a strong potential for the adoption of IFS, as these individuals likely possessed both physical vigor and farming experience (Meshram *et al.*, 2020).

The education level of farmers, measured in years of schooling, averaged 10.69 years, with a standard deviation of 3.87 years. This reflected a reasonable level of formal education among IFS farmers, with 50% of them having at least 12 years of schooling. However, a minimum of one year of schooling highlighted a gap in educational attainment among some farmers, which might have impacted their decision-making and adoption of advanced farming practices (Liu *et al.*, 2018). The reasonable level of education among the majority of farmers facilitated the understanding and implementation of integrated farming practices, which often required knowledge-intensive decision-making.

The average landholding size was reported as 10.58 acres, with a wide standard deviation of 8.00 acres. Landholdings ranged from 1 acre to 40 acres, reflecting substantial variability in land access among farmers. Most farmers (75th percentile) owned up to 14 acres, and the median was 10 acres. This suggested that the majority of IFS farmers were medium to small landholders (Chandran *et al.*, 2023). The variability in landholding sizes underscored the need for tailored IFS models. Small and marginal farmers required specific support for diversification and resource optimization, while larger landholders could focus on integrating higher-value components.

The analysis of net income among Integrated Farming System (IFS) farmers in Dharwad district in Table 2 revealed significant changes between the periods 2019-20 and 2022-23. The average net income in 2019-20 was Rs.3,89,606.58, with a wide variation as indicated by a standard deviation of Rs 2,83,507.16. The income ranged from Rs 46,950 to Rs 13,57,800, highlighting substantial differences in earnings among the farmers. By 2022-23, the mean net income had increased markedly to Rs 8,52,321.40, with a substantially higher standard deviation of Rs 6,10,492.96. The range had also expanded significantly, from as low as Rs 125.74 to as high as Rs 31,20,500. This growth indicated a positive trend in income over the four years, although the data suggested considerable variability among farmers.

The percent change in net income further highlighted this variation. On average, farmers experienced a 141.92 per cent increase in income, with a standard deviation of 51.91 per cent, reflecting diverse levels of growth across the sample. While some farmers saw their income more than triple (383.88%), others achieved relatively smaller gains (97.36%). The disparity in income growth was likely attributed to differences in resources, adoption of farming technologies, market access, or crop diversification strategies.

These findings suggested that even with the positive overall trend of income growth, disparities in earnings and percent changes needed to be addressed. Farmers with smaller gains or declines required targeted support, such as improved access to markets, enhanced farming practices, or resource allocation. Furthermore, analyzing the practices of high-performing farmers could have provided valuable insights that could be scaled to benefit the broader farming community. The observed increase in income reflected the potential of IFS in enhancing farmer livelihoods but also underscored the need for equitable resource distribution and knowledge sharing to

**Table 2:** Net income of respondent IFS farmers in 2019-20 and 2022-23 years and change in income among the years (n=80).

| | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|
| **Net Income 2019-20** | 46950 | 1357800 | 389606.58 | 283507.16 |
| **Net Income 2022-23** | 125.74 | 3120500 | 852321.40 | 610492.96 |
| **Percent Change** | 97.36 | 383.88 | 141.9188 | 51.91 |

ensure inclusive growth (Das *et al.*, 2021).

The correlation analysis provided valuable insights into the socio-economic factors that influenced the livelihoods of Integrated Farming System (IFS) farmers. The negative correlation between age and education (-0.30) indicated that younger farmers were more likely to have higher educational qualifications, possibly reflecting improved access to education in recent years. This trend had positive implications for the adoption of modern agricultural practices, as younger, educated farmers were more inclined to integrate innovative techniques into their farming systems. The positive correlations of education with landholding (0.08), income in 2019-20 (0.12), and income in 2022-23 (0.16) suggested that education played a role in enhancing a farmer's capacity to manage larger landholdings and generate higher incomes. Educated farmers appeared to have better access to information, credit, and markets, which translated into more productive and profitable farming practices. However, the weak correlation between education and percent increase in income (0.05) indicated that education alone did not guarantee significant income growth, emphasizing the need for complementary factors like access to resources and infrastructure.Landholding size showed a strong positive correlation with both income in 2019-20 (0.35) and income in 2022-23 (0.44), underlining the importance of land as a critical asset in agricultural productivity and income generation (Gogoi *et al.*, 2023). Farmers with larger landholdings had more opportunities to diversify their farming activities, invest in high-value crops, and achieve economies of scale, thereby enhancing their income potential. The weak negative correlation between landholding and percent increase in income (-0.02) suggested that farmers with smaller landholdings might have achieved higher relative income growth percentages, possibly due to more efficient use of available resources or engagement in intensive farming practices.

The strong positive correlation between income in 2019-20 and income in 2022-23 (0.78) reflected income stability or growth over the analyzed period. However, the moderate negative correlation between income in 2019-20 and percent increase in income (-0.45) indicated that farmers with higher initial incomes experienced lower percentage growth in income. This suggested that lower-income farmers might have had more room for improvement or that they benefited more from specific interventions or favourable market conditions during the period (Bhagat *et al.*, 2024). The weak positive correlation between income in 2022-23 and percent increase in income (0.16) indicated that while recent income levels had some association with income growth, the relationship was not particularly strong. This highlighted the complexity of income dynamics in IFS systems, where multiple factors, such as crop diversification, market access, and external support, influenced income growth.

## Conclusion

The study highlights the significant role of Integrated Farming System (IFS) models in enhancing the livelihoods of farmers in the Dharwad district. By integrating various agricultural components, IFS not only improved resource utilization but also increased resilience to climatic and market uncertainties. The findings demonstrated a substantial increase in farmers' net incomes between 2019-20 and 2022-23, reflecting the economic benefits of adopting IFS practices. However, the variability in income growth across the sampled farmers underscores the need for tailored interventions, particularly for smaller landholders and those with limited resources. The positive correlation between education and income growth further emphasizes the importance of knowledge and skill development in driving the adoption of sustainable farming practices (Prusty *et al.*, 2020). The interventions by Krishi Vigyan Kendra (KVK) were instrumental in promoting IFS adoption through capacity building, demonstrations, consultancy and financial support, showcasing the potential of institutional support in addressing agricultural challenges. Despite the overall positive trends, disparities in income growth highlight the necessity for equitable resource distribution, improved market access, and continued support for low-performing farmers. By addressing these gaps, IFS models can be scaled effectively, ensuring sustainable agricultural development and enhanced livelihoods for farming communities in Dharwad and similar regions. This study provides valuable insights for policymakers and stakeholders to design inclusive and sustainable agricultural policies that foster rural development.

## References

Bhagat, R., Walia S.S., Sharma K., Singh R., Singh G. and Hossain A. (2024). The integrated farming system is an environmentally friendly and cost effective approach to the sustainability of agri food systems in the modern era of the changing climate: A comprehensive review. *Food and Energy Security*, **13(1)**, e534.

Chandran, V., Saurav S.K., Chakravarty R. and Ashok K. (2023). Contribution of Integrated Farming System (IFS) units towards household income in Kerala. *Indian Journal of Extension Education*, **59(3)**, 69-73.

Das, A., Datta D., Samajdar T., Idapuganti R.G., Islam M., Choudhury B.U., Mohapatra K.P., Layek J., Babu S. and Yadav G.S. (2021). Livelihood security of small holder

farmers in eastern Himalayas, India: pond based integrated farming system a sustainable approach. *Current Research in Environmental Sustainability*, **3**, 100076.

Das, S., Sharma K.K., Majumder S., Das D. and Chowdhury I.R. (2024). Spatio-temporal variation and relationship between agricultural efficiency and irrigation intensity in a semi-arid region of India. *Regional Sustainability*, **5(2)**, 100-144.

Gogoi, K., Sarmah J. and Bora M. (2023). Assessment of Farmers' Knowledge on Integrated Farming System (IFS). *International Journal of Environment and Climate Change*, **13(12)**, 53-60.

Kumari, A., Deb A., Prusty A.K., Suman S., Rout D.S. and Amar A.K. (2024). Preservation of the indigenous medicinal knowledge network of the Bonda tribe. *Indian Journal of Extension Education*, **60(4)**, 40-46.

Liu, T., Bruins R.J. and Heberling M.T. (2018). Factors influencing farmers' adoption of best management practices: A review and synthesis. *Sustainability*, **10(2)**, 432.

Meena, L.L., Mohanty B.K., Prusty A.K. and Rout S. (2020). Impact of KVK training on farmers of Jagatsinghpur district of Odisha. *Journal of Plant Development Sciences*, **12(6)**, 371-374.

Meena, L.R., Kumar L., Meena S.R. and Anjali (2023). Development of a Successful Integrated Farming System Model for Livelihood Sustenance of Dryland Farmers. In *Enhancing Resilience of Dryland Agriculture Under Changing Climate: Interdisciplinary and Convergence Approaches* (323-342). Singapore: Springer Nature Singapore.

Meshram, M., Khare N.K. and Singh S.R.K. (2020). Socio-economic profile of integrated farming system practicing farmers in Madhya Pradesh state. *The Pharma Innovation Journal*, **9(4)**, 155-159.

Prusty, A.K., Panigrahi R.S., Padhy C. and Rout S. (2020). Knowledge level of farmers regarding system of rice intensification (SRI) method in Puri district of Odisha. *Indian Journal of Pure and Applied Biosciences*, **8(3)**, 270-277.

Saha, P., Prusty A.K., Nanda C., Ray S. and Sahoo B. (2024). Professional insights provided by women extension personnel in Odisha. *Indian Journal of Extension Education*, **60(3)**, 101-105.

Sai, M., Prusty A.K., Padhy C. and Reddy I.C. (2024). Migration Behavior of Rural Youth from Agriculture in North Coastal Andhra Pradesh. *Indian Journal of Extension Education*, **60(4)**, 30-34.

Satapathy, A., Satapathy A., Rout D.S., Prusty A.K. and Rout S. (2021). Prevalence of protein energy malnutrition among under-five children in Odisha: a review. *J. Phytopharm.*, **10**, 272-6.

Srinivasarao, C., Lakshmi C.S., Kundu S., Kumar G.R., Somashekar G., Manasa R. and Pratibha G. (2021). Indigenous Technical Knowledge for Enhanced Agronomic Productivity and Soil Health of Small Holder Farmers in Tropical India. *Climate Change and Environmental Sustainability*, **9(1)**, 1-13.

Suman, S., Prusty A.K., Deb A. and Kumari A. (2025). Global Research Trends in Family Farming: A Bibliometric Insight. *Indian Journal of Extension Education*, **61(1)**, 25-31.

Walia, S.S. and Kaur T. (2023). Sustainable Rural Livelihood Security Through IFS. In *Basics of Integrated Farming Systems* (113-155). Singapore: Springer Nature Singapore.