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PROSPECT OF INTEGRATED FARMING SYSTEM

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ABSTRACT

The growing global concerns over food security, environmental degradation, and sustainable livelihoods have underscored the need for resilient agricultural models, particularly for small and marginal farmers. This study, conducted in the Patiala district of Punjab, India, under the aegis of the All India Coordinated Research Project on Integrated Farming Systems (AICRP-IFS), aimed to assess the prospects of IFS adoption across economic, social, technical, ecological, and entrepreneurial dimensions. A total of 300 respondents were surveyed using a structured questionnaire from IFS-adopted villages. Prospect assessment was based on weighted scores assigned to 26 statements spanning five prospect categories. The findings revealed that IFS was widely perceived as economically beneficial, particularly for income diversification and risk reduction. Socially, IFS was seen as compatible with community needs and instrumental in improving livelihoods. Technically, it was viewed as a viable method for resource optimization and income enhancement. Ecologically, IFS was recognized for its potential in conserving biodiversity, improving soil health, and reducing erosion. Entrepreneurially, farmers acknowledged opportunities arising from trained labour, input availability, and market demand. Aspect-wise analysis indicated that a majority of respondents perceived medium to high levels of prospects across all five dimensions. Overall, 63 per cent of farmers perceived a medium, and 22.67 per cent perceived a high prospect for IFS adoption. Correlation analysis showed that variables such as landholding, training attended, farming system, cropping system, and risk-bearing capacity had a significant positive relationship with the prospect of IFS. The study concludes that IFS holds significant promise for enhancing agricultural sustainability, income stability, and rural development, particularly in resource-constrained farming communities.

Keywords: *integrated farming systems, prospect, entrepreneurial, risk-bearing capacity, ecological*

INTRODUCTION

Food security, livelihood stability, environmental conservation, and the preservation of natural resources have emerged as critical global priorities in recent years. The global agricultural sector faces increasing challenges due to climate change, market volatility, resource constraints, and the growing need to improve rural livelihoods (Raghavendra *et al*., 2024; Gamit and Vinaya, 2024; Gamit and Vinaya, 2022). Notably, smallholder farmers dominate the agricultural landscape—more than 410 million farms globally are under 1 hectare, and over 475 million are smaller than 2 hectares, representing 72% and 84% of all farms, respectively (Panwar *et al.,* 2021). In India, approximately 60% of the population depends on agriculture for their livelihood, underscoring the rural and agrarian nature of its economy (Raghavendra *et al.,* 2024). A significant portion of the population in our country resides in rural areas (Vinaya et al., 2018), where agriculture serves as the primary livelihood. Most rural households earn their income through crop cultivation and various allied agricultural activities. Among the farming community, 86% are small and marginal farmers who together manage only 44% of the total arable land (Paramesh *et al.,* 2021). Moreover, the proportion of agricultural land in relation to total land area has declined from 66.70% in 1950–51 to 58.69% in 2022–23 (GoI, 2024). This declining trend in per capita land availability poses serious challenges to agricultural sustainability and profitability (Bhagat *et al.,* 2024; Shanmugam *et al.,* 2024).

With limited scope for expanding cultivable land, enhancing agricultural productivity becomes essential to meet the demands of a growing population. While the Green Revolution led to significant gains in crop productivity—particularly cereals—it also revealed the need for more diversified, resilient, and sustainable farming approaches. In this context, Integrated Farming Systems (IFS) have emerged as a viable solution to address the multifaceted challenges in agriculture, especially in regions vulnerable to environmental and economic stressors. Crop diversification is intended to expand production related activities on various crops and also to lessen risk (Patel et al.,2021). In South Asia, including countries like Bangladesh and India, smallholder farmers are increasingly adopting IFS models that integrate crops, livestock, aquaculture, agroforestry, and other enterprises (Kumar *et al.,* 2018; Singh et al., 2025; Madhuprasad et al., 2024). IFS has been recognized for its capacity to enhance food and livelihood security, optimize resource use, and increase system resilience. It directly contributes to 13 of the 17 United Nations Sustainable Development Goals (SDGs) at the individual farm level, while the remaining four can be addressed through landscape- and cluster-based IFS implementations (Panwar *et al.,* 2021). The design and effectiveness of IFS, however, are highly context-specific, influenced by agro-climatic conditions, land type, socio-economic status of farmers, and market dynamics (Paramesh *et al.,* 2022). Across Asia and Africa, thousands of small and marginal farm families have adopted IFS to diversify production, boost cash income, improve food quality and quantity, and better utilize underused resources (Altieri *et al.,* 2017).

Adopting IFS represents a holistic and sustainable shift in agricultural practice, offering numerous benefits: improved productivity, enhanced income stability, food and nutrition security, and greater ecological balance (Sonawane et al, 2020). However, natural resource degradation such as declining soil fertility, water scarcity, and biodiversity loss combined with climate-change-induced anomalies, poses significant threats to agroecosystems (Palsaniya *et al.,* 2012). The current emphasis on double cropping for food security has disrupted the crop–livestock–soil–environment continuum, further exacerbating ecological vulnerabilities (Palsaniya *et al.,* 2021a). Therefore, increasing agricultural productivity through integrated, sustainable models is crucial to meet the nutritional and economic needs of a growing global population. Integrated farming—referred to as mixed or sustainable farming—blends crop cultivation with livestock rearing, aquaculture, and agroforestry, aiming to maximize resource efficiency, reduce waste, and ensure long-term farm sustainability (Ahmed *et al.,* 2022).

Thus, this paper aims to explore the prospects of Integrated Farming Systems (IFS) as a sustainable approach to enhance farm productivity, improve livelihood security, and ensure ecological balance, particularly for small and marginal farmers in resource-constrained settings.

OBJECTIVE

To study the prospects of integrated farming system in Patiala district of Punjab under All India Co-ordinated Research Project

METHODOLOGY

This study is grounded in pragmatism, which supports the use of both qualitative and quantitative methods. It focuses on practical outcomes and real-world applications, making it suitable for studying the implementation and impact of Integrated Farming Systems (IFS) in rural communities. A deductive approach was used, starting from established theories and frameworks on IFS. These were applied and tested through structured tools to analyze the farmers' perspectives and categorize the nature of IFS prospects.

A mixed-methods design combined quantitative survey data with qualitative case studies. This approach allowed the study to collect broad numeric data while also exploring deeper insights from selected farmers' real-life experiences. The study used a survey to gather standardized data from 300 farmers using a structured questionnaire, and case studies of five progressive farmers to explore individual experiences, innovations, and outcomes in greater detail. It was a cross-sectional study, meaning all data were collected at one point in time. This approach provided a snapshot of the current perceptions and status of IFS implementation in the selected villages.

Data were collected from three villages—Mardanpur, Kamalpur, and Gadapur—in Block Ghanaur, Patiala. Using purposive sampling, 300 IFS beneficiary farmers were surveyed using a semi-structured questionnaire. The study targeted farmers benefiting from the AICRP-IFS project to assess the prospects of Integrated Farming Systems (IFS), a schedule of 26 statements was developed and categorized into six areas: economic, social, technical, ecological, and entrepreneurial. Respondents rated each statement on a three-point scale—More Bright (3), Somewhat Bright (2), and Not at All Bright (1). The total score obtained by each respondent across all statements was calculated as their overall prospect score. Based on these scores, farmers were classified into low, medium, and high prospect categories. In addition, five progressive farmers were selected for qualitative case studies, providing detailed accounts of their integrated farming practices, outcomes, and experiences.

Quantitative data were analyzed using descriptive statistics (mean, frequency, percentage). Scores were processed in Microsoft Excel. Qualitative data from case studies were analyzed using thematic analysis, which helped organize and interpret patterns from interview transcripts. Ethical protocols were followed, including informed consent, voluntary participation, and confidentiality of responses. Data were collected with respect to the dignity and privacy of participants.

RESULTS AND DISCUSSION

1 Prospect in adoption of IFS

1.1 Economical prospect in adoption of IFS

Table 1 presents the economic prospects of Integrated Farming Systems (IFS) based on responses from 300 participants. The top-ranked benefit was increased income sources for emergencies with total weighted score (TWS) 787, followed by IFS being the most profitable system occupied Rank II with T.W.S. 699. High input-output ratio ranked third with T.W.S. 696, and reduced crop failure risk ranked fourth with T.W.S. 690. These results show that farmers consider IFS economically advantageous, especially for income diversification and profitability.

Table 1: Economical prospect in adoption of IFS (n=300)

Sr. No.	Statements	MB	SWB	NAB	T.W.S.	Rank Order
1	**High input-output ratio**	126 (42.00)	144 (48.00)	30 (10.00)	696	**III**
2	**Low risk of crop failure**	115 (38.33)	160 (53.34)	25 (8.33)	690	**IV**
3	**It is highest profitable system**	141 (47.00)	117 (39.00)	42 (14.00)	699	**II**
4	**IFS increase income sources for meeting emergency needs**	195 (65.00)	97 (32.33)	08 (2.67)	787	**I**

MB-More bright, SWB-Somewhat bright, NAB-Not at all bright

1.2 Social prospect in adoption of IFS

Table 2 reveals the social prospect of integrated farming systemin which majority of the farmers agreed that Compatibility to the community needs and requirements with highest total weighted score (TWS) 698 occupied Ist rank followed by followed by Solves the problems of food, fodder, fuel and wood requirement with TMS (650) and improves the quality of life of farmers and their families with TMS (635). Statements related to fencing (634), employment generation (623), and women's empowerment (594) held mid-level importance. IFS is synonymous with progressive farmers (499) and Self-sufficiency in wood and non-wood products (488) ranked lowest

Table 2: Social prospect in adoption of IFS (n = 300)

Sr. No.	Statements	MB	SWB	NAB	T.W.S.	Rank Order
1	**Empowerment of women farmer**	69 (23.00)	156 (52.00)	75 (25.00)	594	**VI**
2	**IFS is synonyms for progressive farmers**	47 (15.67)	105 (35.00)	148 (49.33)	499	**VII**
3	**Compatibility to the community needs and requirements**	115 (38.33)	168 (56.00)	17 (5.67)	698	**I**
4	**Self-sufficiency in wood and non-wood products**	39 (13.00)	101 (33.67)	169 (56.33)	488	**VIII**
5	**Trees in IFS are used for fencing and boundary demarcation**	96 (32.00)	142 (47.33)	62 (20.67)	634	**IV**
6	**Improves the quality of life of farmers and their families**	80 (26.67)	175 (58.33)	45 (15.00)	635	**III**
7	**Employment generation**	54 (18.00)	215 (71.67)	31 (10.33)	623	**V**
8	**Solves the problems of food, fodder, fuel and wood requirement of the farmers**	129 (43.00)	92 (30.67)	79 (26.33)	**650**	**II**

MB-More bright, SWB-Somewhat bright, NAB-Not at all bright

1.3 Technical prospect in adoption of IFS

Table 3 elaborates the technical prospect of integrated farming system in which majority of the farmers agreed that IFS is adopted for "IFS is a proven pathway to doubling farmers' income" with highest total weighted score (TWS) 725 occupied Ist rank, followed by IFS is an eco-friendly technique for controlling water logging, livelihood securities, etc. with TWS 676 occupied II rank. Whereas, "IFS is efficient technique for best utilization of farm resources", "IFS is best use for reclamation of the problematic soil" and "IFS is adopted for diversification of agriculture" occupied III, IV and V rank with TWS 671,612 and 574 respectively.

Table 3: Technical prospect in adoption integrated farming system (n = 300)

Sr. No.	Statements	MB	SWB	NAB	T.W.S.	Rank Order
1	**IFS is adopted for diversification of agriculture**	77 (25.67)	120 (40.00)	103 (34.33)	574	V
2	**IFS is efficient technique for best utilization of farm resources**	93 (31.00)	185 (61.67)	22 (7.33)	671	III
3	**IFS is best use for reclamation of the problematic soil**	113 (37.67)	86 (28.66)	101 (33.67)	612	IV
4	**IFS is a proven pathway to doubling farmers' income**	166 (55.33)	93 (31.00)	41 (13.67)	725	I
5	**IFS is an eco-friendly technique for controlling water logging, livelihood securities, etc.**	129 (43.00)	118 (39.33)	53 (17.67)	676	II

MB-More bright, SWB-Somewhat bright, NAB-Not at all bright

1.4 Ecological prospect

Table 4 reveals the ecological prospect of integrated farming system in which majority of the farmers agreed that IFS protects land through reduction of surface run off and soil erosion with highest total weighted score (TWS) 680 occupied Ist rank followed by "IFS improves micro-climate", "IFS can serve biodiversity", "IFS reduces evaporation from farm land", "IFS improve soil nutrients" occupied II, III and IV ranks with TWS 661, 593 and 515 respectively.

Table 4: Ecological prospect in adoption of IFS (n = 300)

Sr. No.	Statements	MB	SWB	NAB	T.W.S.	Rank Order
1	**IFS can serve biodiversity**	37 (12.33)	219 (73.00)	44 (14.67)	593	III
2	**IFS improves micro-climate**	84 (28.00)	193 (64.33)	23 (7.67)	661	II
3	**IFS improves soil nutrient**	49 (16.33)	117 (39.00)	134 (44.67)	515	V
4	**IFS protects land through reduction of surface runoff and soil erosion**	97 (32.33)	186 (62.00)	17 (5.67)	680	I
5	**IFS reduce evaporation from farm land**	51 (17.00)	166 (55.33)	83 (27.67)	568	IV

MB-More bright, SWB-Somewhat bright, NAB-Not at all bright

1.5 Entrepreneurial prospect

Table 5 reveals the entrepreneurial prospect of integrated farming systemin which majority of the farmers agreed with Availability of trained labour with highest total weighted score (TWS) 2.23 occupied Ist rank followed by "Supply of raw material", "Agro-industries" and "Demand of finished products" occupied II, III and IV ranks with TWS 638, 625 and 570 respectively.

Table 5: Entrepreneurial prospect of IFS (n = 300)

Sr. No.	Statements	MB	SWB	NAB	T.W.S.	Rank Order
1	**Availability of trained labour**	115 (38.33)	141 (47.00)	44 (14.67)	671	**I**
2	**Demand of finished products**	48 (16.00)	174 (58.00)	78 (26.00)	570	**IV**
3	**Agro-industries**	69 (23.00)	187 (62.33)	44 (14.67)	625	**III**
4	**Supply of raw material**	101 (33.67)	136 (45.33)	63 (21.00)	638	**II**

MB-More bright, SWB-Somewhat bright, NAB-Not at all bright

2. Aspect-wise overall prospect of IFS

This section is concerned with the prospect of IFS about various aspects i.e. economical, social, technical, ecological and entrepreneurial prospect. The aspect-wise prospect of IFS has been presented and discussed in this section.

Table 6: Aspect-wise overall prospect of IFS

(n = 300)

Sr. No.	Category	(f)	(%)
A. Economical prospect			
1	**Low** (4-6)	28	09.33
2	**Medium** (7-8)	133	44.33
3	**High** (9-12)	139	46.34
B. Social prospect			
1	**Low** (8-13)	54	18.00
2	**Medium** (14-19)	181	60.33
3	**High** (20-24)	65	21.67
C. Technical prospect			
1	**Low** (5-8)	43	14.33
2	**Medium** (9-12)	165	55.00
3	**High** (13-15)	92	30.67
D. Ecological prospect			
1	**Low** (5-8)	64	21.33
2	**Medium** (9-12)	163	54.34
3	**High** (13-15)	73	24.33
A. **Entrepreneurial prospect**			
1	**Low** (4-6)	46	15.34
2	**Medium** (7-8)	157	52.33
3	**High** (9-12)	97	32.33

2.1 Economical prospect

The distribution of the respondents according to economical prospect has been presented in the Table 6 which revealed that (44.33%) of the respondents perceived medium level of economical prospect followed by high (46.34%) level of prospect and 9.33 per cent of the respondents perceived low economical prospect in IFS practicing respondents.

2.2 Social prospect

Table 6 reveals that most of the respondents (60.33%) perceived the medium level of social prospect regarding IFS and few of them (21.67%) perceived high level social prospect. 18 per cent of the respondents perceived low level of social prospect.

2.3 Technical prospect

It was found that most of the respondents (55.00 %) perceived medium level of technical prospect of IFS and 30.67 per cent perceived to have high level of prospect regarding IFS. However, 14.33 per cent of the respondents perceived low level of technical prospect of IFS.

2.4 Ecological Prospect

This showed that most of the respondents (54.34%) perceived medium level of prospect regarding IFS followed by 24.33 per cent respondents who perceived high ecological prospect and 21.33 per cent respondents perceived low ecological prospect.

2.5 Entrepreneurial prospect

Table 6 reveals that majority of the respondents (52.33%) perceived medium prospect regarding entrepreneurial aspects of IFS followed by 32.33 per cent of the respondents had high and 15.34 per cent of the respondents had low entrepreneurial prospect regarding IFS. This showed that most of the respondents perceived medium to high level of prospect of entrepreneurial aspects of IFS.

3. Overall prospect of integrated farming system (IFS)

The overall prospects of IFS are presented in Table 7. It was found that more than half (63.00 %) of the respondents perceived medium prospect of IFS, followed by 22.67 per cent of the respondents perceived high prospect of IFS system, whereas only 14.33 per cent respondents perceived low prospect of IFS. This showed that about two-third of the respondents perceived medium to high level of IFS, hence the future of IFS was bright under these circumstances.

Table 7: Overall prospect of integrated farming system (n = 300)

Sr. No.	Category	(f)	(%)
1	**Low** (26-41)	43	14.33
2	**Medium** (42-57)	189	63.00
3	**High** (58-74)	68	22.67

4. Correlation of Independent variables with prospect of IFS

The zero-order correlation was computed to determine the relationship between background variable of respondents with the prospect of IFS and the results have been presented in Table 8. It was found that family income (r =0.43), educational qualification (r =0.39), land holding (r =0.56), extension contact (r =0.45), training attended (r =0.4354) and mass media exposure (r =0.40), Farming system (r =0.78), Cropping system (r =0.49), training attended (r =0.72), were positively and significantly correlated (at 0.05% level of probability) with the prospect of IFS. The remaining variables viz., Age (r =0.11) was not found to be significant.

Table 8: Correlation of independent variables with prospect of IFS (n = 300)

Sr. No.	Independent variables	Prospect
X_1	**Age**	0.11
X_2	**Family income**	0.43*
X_3	**Educational qualification**	0.39*
X_4	**Land Holding**	0.56*
X_5	**Extension contacts**	0.45*
X_6	**Mass media exposure**	0.40*
X_7	**Farming system**	0.78*
X_8	**Cropping system**	0.49*
X_9	**Risk bearing capacity**	0.61*
X_{10}	**Training Attended**	0.72*

*Significant at 0.05 level of probability

CONCLUSION

The study highlights the promising potential of Integrated Farming Systems (IFS) as a sustainable and resilient agricultural approach, especially for small and marginal farmers in resource-constrained regions like Punjab. The majority of respondents perceived medium to high prospects of IFS across economic, social, technical, ecological, and entrepreneurial dimensions. IFS was particularly valued for its ability to diversify income, reduce production risks, improve resource utilization, and enhance ecological balance. Positive correlations between the prospects of IFS and variables such as landholding, education, training, farming systems, and risk-bearing capacity further underscore the importance of knowledge, infrastructure, and capacity-building in successful IFS adoption. The findings suggest that with adequate support, training, and extension services, IFS can significantly contribute to achieving food and livelihood security, environmental sustainability, and rural development. Therefore, strengthening IFS adoption through policy incentives and farmer-centric programs can be a strategic step toward sustainable agriculture in India and similar agro-ecological contexts.

RECOMMENDATION

To promote Integrated Farming Systems (IFS), policies should focus on farmer training, input availability, market linkages, and credit support. Strengthening extension services and promoting cluster-based adoption can enhance scalability. Incentives for diversification, eco-friendly practices, and risk mitigation will boost adoption, especially among smallholders, leading to improved income, sustainability, and resilience in resource-constrained rural areas.

CONFLICT OF INTEREST

The authors declare no conflict of interest. The study was conducted independently, and no financial or personal relationships influenced the outcomes, ensuring objectivity and integrity in the research process and its findings.

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