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Constraints and Strategic Suggestions for Enhancing Integrated Farming Systems among Bonda Tribal Family Farms

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HIGHLIGHTS

- Standardized Integrated Farming System (IFS) models often fail to align with the socio-cultural practices of the Bonda tribe, limiting their adoption.
- Farmers face challenges in the adoption of IFS due to limited knowledge, inadequate training opportunities, and irregular weather patterns.
- Suggestions include training, use of traditional knowledge, market cooperatives, and coordination among departments.

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ABSTRACT

Integrated Farming System (IFS) is a sustainable approach that improves productivity, resilience, and livelihoods, especially in tribal regions with limited resources and fragile environments. The study focused on the Bonda tribe, a Particularly Vulnerable Tribal Group (PVTG) in the Khairput block of Malkangiri district, Odisha, and identified the constraints faced by Bonda farmers in adopting IFS practices and suggestions for improvement. Six villages in Khairput block were selected using a simple random sampling method, with 25 respondents from each village, resulting in a total sample size of 150. Data were collected using a structured interview schedule. Garrett's Ranking Technique was applied to rank key constraints, which were grouped into six categories. Content analysis was used to interpret the suggestions provided by the farmers. The main barriers included lack of training (64.57), resistance to change from traditional practices (64.56), and market inaccessibility (62.25). Farmers showed a willingness to adopt IFS if proper support was given. They recommended capacity building, livelihood diversification, better market access, and water and soil conservation strategies. The study emphasizes the need for culturally relevant and participatory IFS models to improve tribal farming systems.

INTRODUCTION

The Integrated Farming Systems (IFS) is a holistic approach for the development of agriculture, where different farm components are intrinsically combined to achieve sustainable productivity and efficiency. This system incorporates various farming elements such as crops, livestock, fisheries and agroforestry. The leftovers of one component are frequently used as inputs for other components in an integrated agricultural system, resulting in a closed-loop system that boosts overall efficiency (Singh et al., 2025). A stronger and more productive agroecosystem is achieved when all components work together in coordination, each supporting the function of the others, like parts of a well-organized system. This system is especially beneficial in ecologically sensitive and resource-constrained regions, offering enhanced income stability, food security, and environmental resilience (Meena et al., 2024).

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In tribal dominated areas, where traditional practices are deeply embedded in socio-cultural frameworks, the adoption of the modern IFS model presents both opportunities and challenges. One such unique tribal community is the Bonda tribe, residing primarily in the Malkangiri district of Odisha.

The Bonda tribe, classified as a Particularly Vulnerable Tribal Group (PVTG) is known for its distinct socio-cultural identity, traditional ecological knowledge, and subsistence-based lifestyle. Historically, the Bondas have lived in close harmony with nature, relying extensively on forest-based resources, shifting agriculture, and mixed cropping patterns (Kumari et al., 2024). Their traditional agricultural practices reflect elements of integrated farming, which links land, water, animals, and forest products to meet household needs. This indigenous system has been passed down through generations and is both socially and ecologically adaptive (Mandi & Chakravarty, 2020).

With increasing exposure to the world outside, government interventions, and the introduction of formal IFS models under agricultural development programs, the traditional practices of the Bonda community are undergoing significant transformation. Although the core principles of IFS resonate with the traditional ecological ethos of the Bondas, the standardized model that are promoted under extension and redevelopment programs frequently do not align with their socio-cultural realities. As a result, the community faces several constraints in fully adopting and adapting to the formal IFS practices. These constraints may be caused due to various factors, including lack of access to technical knowledge, low literacy level, cultural rigidity, inaccessible markets and limited institutional support (Raghav & Srivastava, 2014). Also, the imposition of external models by without adequate customization to the local context often leads to partial adoption. Understanding these constraints is important for designing participatory and context-specific interventions that are culturally sensitive and technically feasible. This research paper aims to document the real and perceived barriers to adoption and explore the suggestions and coping strategies offered by community members themselves. This study fills in the knowledge gaps about how typical IFS models fit the needs of the Bonda tribe.

METHODOLOGY

The present study employed an Ex-post facto research design. The study was carried out in Khairput block of Malkangiri district, Odisha, focusing on Bonda tribal community. The area was selected purposively because of their unique socio-cultural characteristics and community's traditional subsistence-based livelihood systems. Six villages, Andrahal, Badbel, Badpada, Kadamguda, Dumripoda and Kichapada were selected using simple random technique for the study. From each village 25 respondents were selected randomly, making a total sample size of 150. Data were collected through personal interviews using structured interview schedule. Major constraints for the study were identified through local expert including extension personnel, community elders, and NGO workers, familiar with the socio-cultural and agricultural landscape of the Bonda tribe, along with discussions with selected respondents and a thorough literature review. Based on these inputs, six major barrier groups were framed, each comprising 3-4 constraint statements. Respondents were asked to rank the constraints within each group based on their perceived severity.

The analysis of constraints was carried out using Garette's Ranking Technique. The ranks assigned by respondents were converted into percent positions. These percent positions were then converted into scores using the Garrett & Woodworth (1969) conversion table. The total and mean scores were calculated for each constraint, and the constraints with the highest mean score were considered as most severe. To analyse the suggestions gathered through open-ended questions, content analysis was employed. Content analysis is a research method that systematically analyses verbal, visual, or written data and makes valid inferences (Wilson, 2011). To carry out content analysis, the responses of open-ended questions were carefully read, interpreted, and categorized into meaningful themes. The frequency of responses under each theme was counted to identify the most commonly suggested improvements.

RESULTS

The study identified six major categories of constraints impeding the adoption of IFS practices among Bonda tribal family farmers (Table 1). Under the socio-economic constraints, four key issues emerged. The foremost challenge was the low level of education regarding IFS, receiving the highest mean score (62.45) and ranked first. This was followed by poor economic returns from diversified enterprises (50.24), fragmented and limited land holdings (47.80. In the category of technical constraints, the lack of adequate training and exposure visits was cited as the most critical issue (64.57), poor adoption of modern tools and mechanization (58.57) further reflects the technological lag in these communities. For environmental and natural resource-related barriers, the unpredictability of rainfall and recurring water scarcity (61.54) was considered the most pressing issue. Among institutional constraints, respondents highlighted the lack of coordination among agriculture, livestock, and forest departments as the primary hurdle (56.69). The weak linkages with KVKs and agricultural universities (52.09) followed by infrequent visits by extension officers (38.22), further limited institutional support. The market and infrastructure barriers included issues such as poor market access due to remoteness (62.25). Lastly, under cultural and behavioural constraints, a strong resistance to transitioning from traditional practices was the most dominant issue (64.56).

The data in Table 2 shows the suggestions provided by respondents on how to improve the adoption of IFS practices among the Bonda community. These suggestions were grouped into eight major themes, each assigned a code and supported by the number and percentage of respondents who endorsed each idea. The most widely supported recommendation, endorsed by 91.33 per cent of respondents, was to organize regular training programs and field demonstrations to enhance farmers' capacity and knowledge of IFS. There was a suggestion to promote alternative rural livelihoods such as mushroom cultivation, poultry, goat farming, and handicrafts to reduce migration, supported by 86.00 per cent of respondents. Establishing model farms for peer learning was also considered

Table 1. Constraints faced by farmers in IFS practices.

S.No.	Constraints	Garette's Mean Score	Rank
A.	Socio-Economic Constraints		
1.	Low level of education and awareness about IFS	62.45	I
2.	Limited landholding and land fragmentation	47.80	III
3.	Poor economic returns from diversified enterprises	50.24	II
4.	Dependency on traditional farming and forest-based activities	39.80	IV
B.	Technical Constraints		
5.	Inadequate knowledge and skills about integrated farming practices	33.00	IV
6.	Lack of training and exposure visits on IFS	64.57	I
7.	Poor adoption of modern tools and mechanization	58.57	II
8.	Lack of proper waste recycling or composting techniques	42.94	III
C.	Environmental and Natural Resource Constraints		
9.	Soil erosion and declining soil fertility	56.53	II
10.	Unpredictable rainfall and water scarcity	61.54	I
11.	Loss of biodiversity and degradation of forest areas	43.65	III
12.	Wild animal interference and crop damage	37.12	IV
D.	Institutional Constraints		
13.	Infrequent visits by extension officers in tribal areas	38.22	III
14.	Weak linkage with Krishi Vigyan Kendra (KVK) or agricultural universities	52.09	II
15.	Limited convergence between agriculture, livestock, and forest departments	59.69	I
E.	Market and Infrastructure Constraints		
16.	Poor market access due to remote location	62.25	I
17.	Lack of storage, transport or cold chain facilities	57.82	II
18.	Exploitation by middlemen in selling produce	46.67	III
19.	No premium pricing for organic or diversified produce	38.12	IV
F.	Cultural and Behavioural Constraints		
20.	Resistance to change from traditional practices	64.56	I
21.	Language barriers in receiving extension services	36.67	III
22.	Lack of entrepreneurial mindset among tribal youth	48.45	II

Table 2. Suggestions given by respondents

S.No.	Theme	Code	Interpreted Suggestions	*f* (%)
1.	Capacity building and knowledge support	T1: IFS Training	Organize regular training programs, field demonstrations on IFS	91.33
2.	Market access and infrastructure	T2: Local market/ Cooperative setup	Establish direct market access or tribal farmer cooperatives	48.00
3.	Cultural integration and traditional knowledge	T3: Knowledge Integration	Combine traditional methods with modern farming science such as seed banks, climate-smart IFS model, etc.	60.66
4.	Institutional Support and	T4: Model Farms	Setup model farms in nearby area for peer learning	83.33
5.	Demonstration	T5: Water and Soil Conservation	Promote rainwater harvesting and soil health practices	78.00
6.	Natural Resource Management	T6: Departmental Coordination	Strengthen coordination among the agriculture, forest, and livestock departments	42.66
7.	Inter-departmental convergence	T7: Integrated Nutrient Management	Train farmers on composting, vermicomposting and recycling animal-crop waste in IFS	71.33
8.	Waste Recycling and Composting	T8: Livelihood Diversification	Promote value-added activities like mushroom production, poultry, goatery, and crafts to reduce migration	86.00
	Alternate Rural Livelihood			

important, with 83.33 per cent in favour. Natural resource management, including rainwater harvesting and soil health practices, was supported by 78.00 per cent of respondents. Integrating traditional knowledge with modern scientific methods was suggested by 60.66 per cent of respondents, highlighting the need for culturally compatible solutions. The responses indicate a strong demand for comprehensive, sustainable, and inclusive strategies to enhance IFS adoption in tribal farming communities.

DISCUSSION

The constraints faced by the Bonda tribal family farmers in adopting IFS reflect a complex interplay of socio-economic, technical, environmental, institutional, market-related, and cultural factors that are commonly observed in marginalized and remote agricultural communities. The prominence of educational and informational limitations as socio-economic barriers indicates that,

without awareness and literacy about integrated farming practices, even well-designed programs fail to generate intended outcomes. This is in line with Sahu et al., (2024), who found that low educational levels restrict access to extension services and adoption of diversified farming approaches. Similarly, poor economic returns and limited land holdings shows structural poverty and land fragmentation issues, which have long been identified as critical bottlenecks to farm innovations, as highlighted by Masroor (2023). These conditions weaken farmers' capacity to invest in modern technologies, access formal credit systems, and achieve economies of scale Similar results were reported by Kumar et al., (2012), Gupta et al., (2013) and Das et al. (2014). Addressing these challenges through context-specific strategies such as land consolidation, cooperative farming models and inclusive financial instruments is essential for enhancing innovation uptake and ensuring the long-term viability of smallholder agriculture. The technical gaps such as inadequate training and lack of mechanization suggest that technology transfer alone is insufficient, it must be accompanied by context-specific skill development, which has been emphasized in works of Kumar et al.(2023); Shankar et al., (2024); Das et al., (2025) and highlight the need for participatory capacity-building approaches that empower farmers not just as end-users but as active participants in the innovation process. Environmental challenges like erratic rainfall, soil erosion and biodiversity loss reinforce the ecological vulnerability of tribal regions, supporting the arguments by Bharat et al., (2021) that climate-sensitive areas need integrated land and water management solutions for sustainable farming. Institutional constraints such as weak departmental coordination and limited contact with agricultural universities underline systemic governance and delivery inefficiencies. As noted by Seerangan et al., (2025), effective institutional convergence is essential for holistic rural development. Market and infrastructure limitations, particularly in remote areas, perpetuate dependency on intermediaries and reduce profitability are the issues that have been extensively documented in tribal marketing studies (Anamika et al., 2023). Culturally rooted barriers like resistance to change and language difficulties reflect deep-seated behavioural patterns and social norms, often overlooked in a top-down policy approach. These findings advocate for inclusive, socially embedded extension models to overcome such barriers.

The suggestions offered by Bonda tribal farmers for enhancing the adoption of IFS reveal a forward-looking and solution-oriented mindset among Bonda farmers. Their suggestion for regular training, model farms and field demonstrations points towards a preference for experiential and peer-based learning approaches, consistent with the findings of Prajapati et al., (2025), who noted that participatory learning platforms significantly improve adoption rates among smallholders. The emphasis on livelihood diversification, including activities like mushroom production and poultry, aligns with broader rural development discourse, which advocates for multi-enterprise models to reduce economic vulnerabilities and seasonal migration (Gautam & Andersen, 2016). Natural resource management practices such as rainwater harvesting and soil conservation are increasingly recognized as an essential component of climate-resilient agriculture, as evidenced by studies from Bhatnagar et al., (2024). The idea to mix traditional knowledge with modern science shows how respecting local culture can make new methods more acceptable and useful. This integration works best when simple traditional practices like organic composting or herbal pest control are enhanced with scientific inputs such as microbial inoculants or integrated pest management. Such combinations make farming more efficient while preserving cultural identity and ecological sustainability. As Malapane et al., (2024) argue, indigenous knowledge systems can enhance the ecological and cultural sustainability of farming innovations. The call for cooperative marketing and better departmental coordination reflects an understanding of systemic gaps and a desire for institutional reform, which is in line with the suggestions of Ezeudu & Obimbua (2024) on the importance of market access and coordinated support in scaling sustainable agriculture.

CONCLUSION

The study reveals a range of interconnected barriers hindering the adoption of IFS among Bonda tribal family farmers. Despite these constraints, the farmers exhibited a positive outlook by suggesting actionable measures such as regular training, exposure visits, model farm development, and livelihood diversification. They emphasized the importance of integrating traditional knowledge with modern agricultural practices, alongside improving soil and water conservation and enhancing market linkages. The findings of the study show the strong willingness among Bonda farmers to adopt sustainable and integrated practices if proper support system is available. Addressing the barriers through participatory and context-specific strategies can significantly enhance the success of IFS in tribal regions. The study provides valuable insights for policymakers, extension agencies and other stakeholders working to improve tribal livelihoods and sustainable farming in remote areas like Malkangiri.

REFERENCES

Anamika, Ghalawat, S., Goyal, M., Malik, J. S., & Bishnoi, D. (2023). Constraints faced by tomato growers at production and marketing level in Haryana. *Indian Journal of Extension Education*, *59*(2), 142-145. https://doi.org/10.48165/IJEE.2023.59232

Bharat, B., Chapke, R., & Kammar, S. (2021). Farmers' perception about climate change and response strategies. *Indian Journal of Extension Education*, *58*(1), 7-11. https://epubs.icar.org.in/index.php/IJEE/article/view/119144

Bhatnagar, S., Chaudhary, R., Sharma, S., Janjhua, Y., Thakur, P., Sharma, P., & Keprate, A. (2024). Exploring the dynamics of climate-smart agricultural practices for sustainable resilience in a changing climate. *Environmental and Sustainability Indicators*, *24*, 100535. https://doi.org/10.1016/j.indic.2024.100535

Das L., Nain M.S., Singh R.& Burman R. R. (2014). Constraints in marketing of fruits as perceived by the fruit growers and NERAMAC in Assam. *Journal of Community Mobilization and Sustainable Development,* 9(2), 114-117.

Das, N., Modak, S., Prusty, A. K., Saha, P., & Suman, S. (2025). Understanding and overcoming key challenges of agripreneurs in southern Odisha: A Case Study. *Indian Journal of Extension Education*, *61*(2), 118-122. https://doi.org/10.48165/IJEE.2025.612RN05

Ezeudu, T. S., & Obimbua, E. N. (2024). Enhancing rural market access and value chain integration for sustainable agricultural

development in Nigeria: A Study of Constraints, Strategies, and Implications. *International Journal of Research and Innovation in Social Science, 8*(3), 528-550. http://dx.doi.org/10.47772/IJRISS.2024.803039

Garrett, E. H. and Woodworth, R.S. (1969). Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay, pp. 329

Gupta B., Kher S.K. & Nain M.S. (2013). Entrepreneurial behaviour and constraints encountered by dairy and poultry entrepreneurs in Jammu Division of J&K State. *Indian Journal of Extension Education,* 49 (3&4), 126-129.

Goutam, Y., & Andersen, P. (2016). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. *Journal of Rural Studies, 44*, 239-249. https://doi.org/10.1016/j.jrurstud.2016.02.001

Kumari, A., Deb, A., Prusty, A. K., Suman, S., Rout, D. S., & Amar, A. K. (2024). Preservation of the indigenous medicinal knowledge network of the Bonda tribe. *Indian Journal of Extension Education*, *60*(4), 40-46. https://doi.org/10.48165/IJEE.2024.60408

Kumar Sunil, Nain M. S., Sangeetha V. & Satyapriya (2023). Determinants and Constraints for Adoption of Zero Budget Natural Farming (ZBNF) Practices in Farmer Field School, *Indian Journal of Extension Education*, 59(4), 135-140. https://doi.org/10.48165/IJEE.2023.59427

Kumar P. & Nain M. S. (2012). Technology use pattern and constraint analysis of farmers in Jammu district of Jammu and Kashmir state of India. *Journal of Community Mobilization and Sustainable Development,* 7 (2),165-170.

Malapane, O. L., Musakwa, W., & Chanza, N. (2024). Indigenous agricultural practices employed by the Vhavenda community in the Musina local municipality to promote sustainable environmental management. *Heliyon*, *10*(13), e33713. https://doi.org/10.1016/j.heliyon.2024.e33713

Mandi, K. & Chakravarty, R. (2020). Tribals in agriculture. *Agriculture Update*, 15(1&2), 104-111. http://dx.doi.org/10.15740/HAS/AU/15.1and2/104-111

Masroor, A. (2023). Evidence for land fragmentation and awareness around agricultural cooperatives. *Acta Scientific Agriculture, 7*(11), 05-25. https://doi.org/10.31080/ASAG.2023.07.1311

Meena L. R., Kochewad S. A., Kumar, D., Malik S., Meena, S. R., & Anjali (2024). Development of sustainable integrated farming systems for small and marginal farmers and ecosystem services - A comprehensive review. *Agricultural Science Digest. 44*(3): 391-397. http://dx.doi.org/10.18805/ag.D-5961

Prajapati, C. S., Priya, N. K., Bishnoi, S., Vishwakarma, S. K., Buvaneswari, K., Shastri, S., Tripathi, S., & Jadhav, A. (2025). The role of participatory approaches in modern agricultural extension: bridging knowledge gaps for sustainable farming practices. *Journal of Experimental Agriculture International 47*(2), 204-22. https://doi.org/10.9734/jeai/2025/v47i23281

Raghav S., & Srivastava, S. K. (2014). Constraints in adoption of farming systems on tribal farms in Uttarakhand. *Journal of Hill Agriculture, 5*(2), 174-178. http://dx.doi.org/10.5958/2230-7338.2014.00860.X

Sahu, S., Bishnoi, S., Sharma, P. R., Satyapriya, Mahra, G. S., Burman, R. R., Barua, S., Madhavan M. M., Sangeetha, V., Sinha, S. K., Singh, R., Wason, M., Joshi, P., & Sharma, S. (2024). Exploring popular information sources and determinants of farmers' access to agricultural extension services in the Indo-Gangetic plains. *Frontiers in Sustainable Food Systems, 8*, 1339243. https://doi.org/10.3389/fsufs.2024.1339243

Seerangan, C., Ravi, R. V., Gnana Saranya, S., & Ramesh, S. (2025). A Study on convergence as best practice for rural development. *International Journal of Research Publication and Reviews, 6*(1), 37-4

Shankar, K. R., Nirmala, G., Pankaj, P. K., Rohit, J., Beevi, C. N. A., Kumar, S. V., & Singh V. K. (2024). Technology transfer in dryland ecosystems: issues and strategies. *Indian Journal of Dryland Agricultural Research and Development, 39*(2), 143-151. https://doi.org/10.5958/2231-6701.2024.00028.6

Singh, K., Walia, S. S., Kumar, P., & Singh, P. (2025). Integrated farming system: A holistic approach to sustainable agriculture. *Indian Farming*, *74*(10), 06-09. https://epubs.icar.org.in/index.php/IndFarm/article/view/163709

Wilson, V. (2011). Research methods: Content analysis. *Evidence-Based Library and Information Practice, 6*(4), 177-179. http://dx.doi.org/10.18438/B8CG9D