AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 02, Issue: 11 (November, 2025)
Available online at http://www.agrimagazine.in


# Climate-Smart Integrated Farming: A Sustainable Approach for Smallholders

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Indian agriculture stands at a crossroads — facing the dual challenge of climate change and declining farm incomes. With unpredictable rainfall, rising input costs, and fragmented landholdings, smallholders are the most vulnerable. In this context, Climate-Smart Integrated Farming Systems (IFS) have emerged as a practical and sustainable pathway to ensure profitability, resilience, and food security.

## What is Climate-Smart Integrated Farming?

The Integrated Farming System is not just a production method — it's a philosophy that combines crop, livestock, fisheries, horticulture, and agroforestry components into a unified farm enterprise. When aligned with climate-smart principles such as resource recycling, emission reduction, and enhanced soil health, it creates a system that is both economically viable and environmentally sustainable.

## Resilience through Diversity

In conventional monocropping systems, farmers rely on a single crop, making them vulnerable to drought, pests, or market failure. IFS reduces this risk through enterprise diversification. For instance, a smallholder integrating dairy, poultry, and vegetables alongside field crops not only secures multiple income sources but also ensures year-round food and nutrition security for the family. A study by ICAR (2022) under the Farmer FIRST Programme revealed that small farmers adopting IFS experienced a 25–40% increase in net farm income and a 15–20% improvement in employment generation compared to non-adopters.

## Climate Adaptation in Practice

IFS contributes to climate adaptation by improving soil organic carbon, water use efficiency, and nutrient recycling. Crop residues are converted into compost or livestock feed, while animal waste is reused as manure or biogas feedstock. Technologies like drip irrigation, vermicomposting, and solar pumps are increasingly integrated into IFS models. For example, farmers in Tamil Nadu have adopted solar-powered dairy units and biogas-linked vegetable cultivation, reducing energy costs and emissions.

## Policy and Institutional Support

Government initiatives such as the National Mission for Sustainable Agriculture (NMSA), Rashtriya Krishi Vikas Yojana (RKVY), and Farmer FIRST Programme (FFP) promote integrated and climate-smart practices. Moreover, schemes under NABARD and ICAR Institutes provide training, demonstration, and financial support for on-farm IFS models. The NITI Aayog (2024) report emphasizes IFS as a 'transformative approach to double farmers' income sustainably,' urging states to replicate successful models through Krishi Vigyan Kendras and FPO networks.

## Success from the Field

Across India, smallholders are reaping the benefits. In Odisha, rice-fish-duck systems have improved farmers' income by nearly 50%, while in Punjab, integration of dairy with horticulture and solar energy has significantly reduced carbon footprints. Similarly, Maharashtra's dryland farmers are adopting agroforestry-linked IFS models that ensure both income and ecological stability. These examples show that integrating enterprises doesn't just build resilience — it empowers farmers to become entrepreneurs of sustainability.

## Challenges Ahead

Despite its benefits, scaling up climate-smart IFS faces hurdles such as limited technical knowledge, lack of credit, and fragmented extension support. Strengthening capacity building, market linkages, and policy convergence among departments is vital to mainstream IFS adoption across regions.

## The Way Forward

The path to climate-smart agriculture lies in integration, innovation, and inclusion. Empowering smallholders with knowledge, technology, and institutional support will make farming not only climate-resilient but also profitable. As India moves towards its Vision 2047 for agricultural transformation, Integrated Farming Systems will be the cornerstone of sustainable rural prosperity — ensuring that every drop, seed, and resource on the farm counts.

## Conclusion

Climate-Smart Integrated Farming represents a forward-looking solution for India's smallholders. By merging sustainability with profitability, it ensures that farmers not only survive climate uncertainty but thrive in it. The integration of traditional wisdom with modern technologies will pave the way toward a more secure and resilient future.

## About the Author

Mukul Kirar is a Postgraduate Scholar in Agricultural Extension at Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya (RVSKVV), Gwalior, Madhya Pradesh. His research focuses on the livelihood security of farmers through Integrated Farming System modules under the Farmer FIRST Programme.