

ISBN : 978-81-997322-9-2

FROM RESEARCH TO REALITY: EXPERIENCES FROM FARMERS' FIELDS

Ujjwal Kumar, Sudhanshu Shekhar, V K Yadav, Dhiraj Kumar Singh,
Anirban Mukherjee, Deokaran, Ramkewal, Abhay Kumar, Awani Kumar Singh and Anup Das



ICAR Research Complex for Eastern Region

ICAR Parisar, P.O. - B. V. College
Patna - 800 014, Bihar

FROM RESEARCH TO REALITY: EXPERIENCES FROM FARMERS' FIELDS

Editors

Ujjwal Kumar
Sudhanshu Shekhar
V K Yadav
Dhiraj Kumar Singh
Anirban Mukherjee
Deokaran
Ramkewal
Abhay Kumar
Awani Kumar Singh
Anup Das



ICAR RESEARCH COMPLEX FOR EASTERN REGION, PATNA

ISBN: 978-81-997322-9-2

From Research to Reality: Experiences from Farmers' Fields

Year of Publication: 2026

Correct Citation

Kumar Ujjwal, Shekhar S, Yadav V K, Singh D K, Mukherjee A, Deokaran, Ramkewal, Kumar A, Singh A K and Das A. (2026). From Research to Reality: Experiences from Farmers' Fields, ISBN No. 978-81-997322-9-2, ICAR Research Complex for Eastern Region, Patna, pp 126.

©ICAR-Research Complex for Eastern Region, Patna

Published by

Director

ICAR-Research Complex for Eastern Region,

ICAR Parisar, PO: Bihar Veterinary College

Patna 800014, Bihar

E-mail: director.icar-rcer@icar.org.in

Web : www.icarcer.org.in

Printed at: M/s Virtue Enterprises

S.K Nagar, Patna - 800001, Mob.: 9304410331, 9162040001

Financial support: Climate Resilient Agriculture Programme

Disclaimer: The information presented in this book is based on field experiences, case studies, farmer interactions, and institutional interventions documented during the course of various research and extension activities. While every effort has been made to ensure the accuracy and authenticity of the information, the authors and publishers do not guarantee the completeness or absolute accuracy of the data presented. The editors and publisher are not responsible for any consequences arising from the use of the information contained herein.

IARI ALUMNI ASSOCIATION

Pusa Campus, New Delhi-110012, India



Prof. Anil Kumar Singh

Adjunct Professor

Former Vice-Chancellor, RVSKVV, Gwalior &

Former DDG (NRM), ICAR, New Delhi

Foreword

Agriculture in India is undergoing a critical transition as the nation strives to ensure food and nutritional security, enhance farmers' income, and promote sustainable management of natural resources. In this context, the integration of scientific innovations with field-level-extension assumes paramount importance. Natural Resource Management (NRM)-based technologies, when appropriately tailored and effectively disseminated, have the potential to significantly improve productivity, profitability, and resilience of farming systems. It is a matter of great satisfaction that this book entitled *"From Research to Reality: Experiences from Farmers' Fields"*, brings together inspiring success stories of farmers who have enhanced their income through technological interventions and technical guidance provided by the ICAR.



The eastern region of India, despite its rich natural resource base, faces persistent challenges such as floods, droughts, soil degradation, and fragmented landholdings. The experiences documented in this publication clearly highlight how farmer-centric, participatory, and location-specific extension strategies can successfully address these constraints. They underline the importance of approaches such as frontline demonstrations, on-farm trials, capacity building, and strong farmer-scientist linkages in accelerating technology adoption.

The efforts made by ICAR Research Complex for Eastern Region (ICAR RCER) and its network of Krishi Vigyan Kendras (KVKs) in promoting integrated farming systems, resource-use efficiency, diversification, and value addition are commendable. These initiatives have significantly contributed to enhancing farm productivity and income while ensuring sustainability.

This document will serve as a useful reference for researchers, extension professionals, policymakers, and development practitioners. More importantly, it will inspire farmers to adopt proven technologies suited to their local conditions. The lessons drawn from these success stories will help in refining future extension strategies and strengthening last-mile delivery systems.

The efforts of ICAR- RCER, KVKs, and the progressive farmers who have made these success stories possible, are certainly praiseworthy. I am confident that this book will contribute meaningfully to advancing agricultural extension systems and achieving sustainable agricultural development through science-led interventions.

Anil Kumar Singh

Preface

Agriculture in India is not merely a means of livelihood but a way of life that sustains millions of households and forms the backbone of the national economy. In recent years, the sector has been facing multifaceted challenges such as shrinking landholdings, climate variability, degradation of natural resources, rising input costs, and market uncertainties. Amidst these constraints, the pathway to enhancing farmers' income lies in the adoption of appropriate technologies, scientific management practices, diversification, and strong institutional support. This book entitled “From Research to Reality: Experiences from Farmers' Fields”, is an earnest effort to document and showcase such pathways through real-life success stories of farmers who have transformed their farming systems and livelihoods with the intervention of modern technologies and technical guidance.

The success stories compiled in this volume reflect the impactful role played by the ICAR Research Complex for Eastern Region, its centre and Krishi Vigyan Kendras (KVKs) in fostering science-led agricultural development. Through need-based research, on-farm testing, frontline demonstrations, capacity building programmes, and continuous advisory services, scientists have worked closely with farmers to bridge the gap between research and practice. These efforts have enabled farmers to adopt improved crop varieties, advanced agronomic practices, precision farming tools, integrated farming systems, mechanization, livestock and fisheries innovations, climate-resilient technologies, and value addition and processing techniques.

Each narrative presented in this book goes beyond numbers and statistics. It captures the journey of farmers who dared to innovate, experimented with new ideas, and trusted scientific guidance to overcome traditional limitations. The stories highlight not only increased productivity and income but also improved resource-use efficiency, reduced risk, enhanced sustainability, and better resilience against climatic and economic shocks. They demonstrate how informed decision-making and timely technological interventions can transform subsistence farming into a profitable and sustainable enterprise.

This compilation also emphasizes the importance of strong farmer–scientist linkages. The participatory approach adopted by ICAR RCER and KVKs, wherein farmers are treated as partners in innovation rather than mere recipients of technology, emerges as a key factor behind these successes. The experiences documented herein provide valuable insights for scaling up proven technologies and replicating successful models across similar agro-ecological regions.

The book is intended to serve as a source of inspiration, learning, and guidance for farmers, extension personnel, researchers, students, planners, policymakers, and development agencies. It is hoped that these success stories will motivate farming communities to embrace scientific innovations, encourage extension systems to strengthen outreach efforts, and support policymakers in formulating farmer-centric and technology-driven agricultural strategies.

We place on record our deep sense of gratitude to the progressive farmers who shared their experiences with openness and pride. We gratefully acknowledge the Indian Council of Agricultural Research (ICAR) for its valuable support and contribution towards the publication of this book. The editors acknowledge the dedicated efforts of scientists, extension functionaries, and field staff of ICAR RCER and the Krishi Vigyan Kendras, whose commitment, perseverance, and vision have made these success stories possible. It is our sincere hope that this book will promote the wider dissemination of agricultural technologies and will inspire collective action towards achieving sustainable, resilient, and income-enhancing agriculture for the future.

Editors

Contents

SI No.	Title	Page no.
1	Introduction	1-3
2	Natural Resource Management	4-21
2.1	Transforming Low Productive Land into a Profitable Farm through Integrated Approach	4-6
2.2	Solar-Powered Irrigation as a Catalyst for Farm Productivity and Income Enhancement	6-9
2.3	Scientific Vegetable Farming System and IPM for Income Enhancement Near Forest Ecosystems	9-12
2.4	Transforming Unproductive Wetlands into a Thriving Aquaculture Enterprise	12-14
2.5	Diversified Vegetable Based Farming Boosted Income and Sustainability: A Success Story from Buxar	15-18
2.6	From Conventional Farming to Climate-Smart Diversification: The Transformation of a Marginal Farmer	18-21
3	Diversification and Integrated Farming System (IFS)	22-51
3.1	From Farm to Foreign Market: High-Value Income through Integrated Farming System	22-24
3.2	Enterprise Diversification through Scientific Farming for Livelihood Security	25-27
3.3	Transforming Rainfed Farming into a Profitable Integrated Farming Model through Vermicompost and Diversification	27-30
3.4	Women-Led Farm Transformation Through Science-Based Diversification	31-33
3.5	Scientific Interventions Reshaping Farming Systems in Ramgarh: A Success Story of Integrated Diversification	34-35
3.6	Enhancing Farm Income through Integrated Farming System (IFS): A Success Story of Mr. Anil Kumar Sinha from Nalanda, Bihar	36-38
3.7	From Traditional Farming to Integrated Farming : The Success of Mr. Jainarayan Kaji	38-40
3.8	Turning Small Holdings into Wealth: A Story of Scientific Farming Excellence	40-43
3.9	From Struggle to Strength: A Farmer's Journey Towards Prosperity in Nawada	43-45
3.10	From Conventional Cropping to Diversified Enterprise: A Small Farmer's Success Story	46-49
3.11	When Knowledge Meets the Soil: A Graduate's Journey to Farming Success	49-51
4	Vegetables-Based Farming Systems	52-64
4.1	Round-the-Year Vegetable Production for Higher Income	52-53
4.2	Enhancing Farm Income Through Vegetable-Goat Integration	54-56
4.3	Turning Tradition into Technology: A Successful Shift to Vegetable-Based Farming	56-58
4.4	Cultivating Confidence and Income through Sustainable Vegetable Farming	59-60
4.5	Vegetable Production Became a Socio-Economic Game Changer: A Success Story from Buxar	61-64

5	High-Value Crops and Commercial Agriculture	65-76
5.1	Scientific Cultivation of Sweet Corn and Early Potato for Higher Profitability	65-68
5.2	From Small-scale Trader to Multi-crore Mushroom Entrepreneur: The Journey of Shubham Modi	69-71
5.3	From Financial Distress to Leadership: A Women-centric FPO Success Story	71-74
5.4	Home-scale Mushroom Cultivation for Sustainable Livelihood and Nutritional Security Among Landless Women: A Success Story from Jharkhand	74-76
6	Livestock and Allied Sectors	77-86
6.1	Scientific Piggery for Income, Resilience and Social Dignity: An SCSP Success Story	77-79
6.2	Economic Empowerment through Scientific Black Bengal Goat Farming in Jamui, Bihar	80-82
6.3	Enhancing Livelihood Security of a Woman Farmer Through Scientific Goat Management	82-84
6.4	Technology-driven Aquaculture Enterprises for Strengthening Fish Seed Supply Systems	84-86
7	Women and Youth-Led Success Stories	87-105
7.1	Cultivating Confidence and Prosperity: A Tribal Youth Success Story	87-90
7.2	From Fields to Financial Freedom: A Woman-led Success Story	91-94
7.3	From Traditional Practices to Integrated Prosperity: A Young Farmer's Science-Led Success Story	94-96
7.4	Women-Led Scientific Farming and Nursery Entrepreneurship in a Coal Mine-Affected Area	96-99
7.5	Women Empowerment through Science-Led Crop-Livestock Integration: The Success Story of Mrs. Gudiya Devi	99-102
7.6	Promoting Medicinal Plant-based Livelihoods through Farm-to-pharma Model: The Entrepreneurial Journey of Smt. Shweta Kumari	103-105
8	Entrepreneurship Development and Agribusiness	106-121
8.1	Elbina Ekka: From Tribal Healer to Doctor Didi – Cultivating Ayurveda, Empowering a Community	106-110
8.2	From Unemployment to Rs. 2 Crore Enterprise: The Nursery Revolution of Mr. Shrawan Kumar Gupta	110-113
8.3	Vegetable Nursery Production through Soilless and Grafting Technologies: The Entrepreneurial Journey of Mr. Bishun Murmu	113-115
8.4	Beekeeping Transformation of Household Income and Employment Generation: A Success Story from Buxar	116-118
8.5	Egg Production (Layer Farming) Became a Socio-Economic Game Changer: A Success Story from Buxar	118-121
8.6	Empowering Tribal Livelihoods through Science-Led Farming	122-126

Chapter - 1

Introduction

1. INTRODUCTION

Agriculture in Eastern India, particularly Bihar and Jharkhand, is characterized by small, marginal and fragmented landholdings, low productivity, limited market access, and high vulnerability to income shocks. Traditional farming systems often fail to provide sustainable livelihoods, especially for rural youth and women. Across all the case studies which have been compiled in this manuscript (Crop diversification, integrated farming system, aquaculture, goat farming, nursery, mushroom, high value crops, FPO-based agripreneurship, and women-led enterprises), a clear pattern emerges—the success is not accidental but driven by a set of common, reinforcing factors. These can be understood as the core drivers of transformation in rural livelihoods:

1.1. Strong Institutional Support (ICAR & Allied Systems)

The single most consistent driving force is continuous technical handholding by ICAR-RCER, its regional station, KVKs and allied institutions.

- Farmers received training, demonstrations, and on-field advisory
- Exposure to scientific practices (Package of practices, IFS, composting, breeding, nursery management, etc)
- Long-term mentoring, not one-time intervention

☞ This converted knowledge gaps into technical competence and reduced failure risk.

1.2. Adoption of Scientific and Improved Technologies

All successful cases show a shift from traditional to science-based farming systems:

- Diversification of crops and enterprises: Crop, vegetables, livestock, mushroom
- Aquaculture: Biofloc, Recirculating Aquaculture Systems (RAS), multi-species culture
- Goat farming: Scientific breeding, feeding, health care
- Mushroom: Controlled composting, environmental management
- Nursery: Grafting, mother blocks, standardized media
- IFS: Resource recycling, enterprise integration

☞ Technology adoption directly improved productivity, survival rate, and quality, leading to higher income.

1.3. Diversification and Integrated Farming Systems (IFS)

A major driver is moving away from single-enterprise farming:

- Integration of crops + livestock + fish + mushroom + nursery

- Waste recycling (e.g., poultry waste → fish feed, mushroom waste → vermicompost)
- Multiple income streams



This ensured:

- Risk reduction
- Year-round income
- Better resource utilization

1.4. Market Orientation & Value Chain Linkages

Successful farmers were not just producers but market-oriented entrepreneurs:

- Direct linkage with government departments, FPOs, and buyers
- Staggered harvesting and demand-based production
- Value addition (sweet corn processing, mushroom products, herbal products)
- Inter-state marketing (Jharkhand, Bihar, WB, Odisha)



This improved:

- Price realization
- Income stability
- Scalability of enterprises

1.5. Access to Quality Inputs and Infrastructure

Key transformation came from ensuring input and infrastructure support:

- Quality fish seed, elite breeding stock, spawn, planting material
- Hatcheries, compost units, nursery infrastructure
- Processing units (sweet corn, mushroom, herbal products)



This addressed a major constraint: poor-quality inputs leading to low productivity

1.6. Capacity Building and Skill Development

All cases highlight hands-on training and skill acquisition:

- Practical learning (not just theoretical)
- Continuous upgrading of skills
- Farmer-to-farmer learning and exposure visits



This built confidence and entrepreneurship mindset, especially among youth and women.

1.7. Entrepreneurship and Risk-Taking Behaviour

A defining factor is the shift in mindset:

- From subsistence farming → agribusiness approach
- Willingness to invest, experiment, and scale
- Long-term vision (e.g., hatchery, FPO, training centres)



This psychological shift is as important as technology.

1.8. Financial Support and Convergence

Many successes were enabled by access to credit and subsidies:

- Government schemes (state subsidies, bank loans)
- Institutional convergence (ICAR + FPO + JSLPS + NABARD-type linkages)



Helped overcome:

- High initial investment barriers
- Working capital constraints

1.9. Women Empowerment and Collective Institutions (FPOs)

In several cases:

- Women-led enterprises (Albina Ekka, Sujayanti Devi, Shweta Kumari)
- FPO-based collective farming and processing
- Employment for rural women



Outcomes:

- Social inclusion
- Income security
- Leadership development

1.10. Scalability, Replicability and Knowledge Dissemination

Successful farmers became:

- Resource persons
- Trainers of other farmers (1000+ trained in some cases)
- Demonstration models



This created a multiplier effect, expanding impact beyond individual farms.

1.11. Addressing Core Constraints Systematically

Each success story tackled key rural constraints:

Constraint	Solution
Low productivity	Scientific practices
Input cost rise	Resource recycling, IFS
Poor seed quality	Hatchery/nursery development
Market uncertainty	Value chains, FPOs
Climate variability	Diversification
Unemployment	Enterprise-based farming



2.1 TRANSFORMING LOW PRUDUCTIVE LAND INTO A PROFITABLE FARM THROUGH INTEGRATED APPROACH

Profile of the farmer

Name: Mr. Vijay Ojha, Age: 54 years, Address: Heramdaga, Post: Gola, Block: Gola, District: Ramgarh, Mobile No.: 9931334227, Education: Intermediate, Farming Experience: 20 Years, Awards & Recognition: Birsa Kisan Shri Award, District Level Best Farmer Award



Situation Analysis/ Problem Statement

Mr. Vijay Ojha was earlier dependent on a small stationery shop for livelihood. He owned about 4.0 ha of land, which remained largely unproductive due to poor soil health, lack of irrigation management, and non-scientific farming practices. Low farm productivity, high production risks, and limited income opportunities constrained his socio-economic growth.

Plan, Implementation and Support/ Interventions

Under the guidance of Krishi Vigyan Kendra (KVK), Ramgarh, Mr. Ojha participated in Integrated Farming System (IFS) training programmes. A holistic, technology-driven intervention was implemented in line with the national vision of Doubling Farmers' Income (DFI) and Viksit Bharat@2047.

Major interventions included

- Soil testing, land development, and soil fertility improvement through organic manuring and balanced fertilization
- Adoption of improved crop varieties and scientific crop management practices
- Crop diversification with cabbage, cauliflower, sweet corn and French bean
- Establishment of mango orchard with vegetable intercropping
- Introduction of fisheries as an allied enterprise
- Continuous technical backstopping, exposure visits, and advisory support by KVK scientists

Technologies and Practices Adopted

- Soil testing and application of recommended doses of fertilizers
- Use of improved and high-yielding crop varieties
- Scientific nursery raising and proper transplanting techniques
- Adoption of Integrated Nutrient Management (INM) and Integrated Pest Management (IPM)
- Crop diversification with cabbage, cauliflower, sweet corn and French bean

- Intercropping of vegetables in mango orchard during initial growth years
- Efficient irrigation management and timely intercultural operations

Economic Impact of Technology / Intervention

The adoption of improved package of practices resulted in a substantial increase in productivity, profitability, and income stability.

Income Change

- *Before intervention:* Net income – **Rs. 1.54 lakh/year**
- *After intervention:* Net income – **Rs. 6.11 lakh/year**

Nearly four-fold increase in net income, directly contributing to the Doubling Farmers' Income objective. The diversified enterprises and improved package of practices ensured round-the-year income, efficient resource utilization, and reduced production risk.

Impact and Outcomes

- Enhancement in system productivity
- Enhanced livelihood security and reduced dependence on non-farm income
- Improved adoption of scientific and climate-resilient agricultural practices

Table 2.1.1 : Enterprise-wise Economic Details (Before intervention)

Enterprises / Crops	Area (Acre)	Production (qt.)	Gross Income (Rs.)	Net Income (Rs.)
Paddy	2.5	31	45,570	30,000
Potato	1.0	37	37,000	24,000
Mango	5.0	126	126,000	100,000
Total			208,570	154,000

Table 2.1.2 : Enterprise-wise Economic Details (After intervention)

Enterprises / Crops	Area (Acre)	Production (qt.)	Gross Income (Rs.)	Net Income (Rs.)
Paddy	1.0	40	83,700	57,700
Potato	0.5	42	84,000	50,800
Cauliflower and Cabbage	0.3	26	52,000	3,7000
Sweet corn	2.0	140	2,80,000	185,000
Mango	5.0	192	2,30,000	200,000
Fish pond	0.5	4.64	1,16,000	81,200
			7,29,700	611,700

- Annual net farm income increased from Rs 1.4 lakh to Rs 6.11 lakh, ensuring year-round income and employment generation.
- Demonstration effect leading to increased interest among neighboring farmers

Lessons Learned and way forward

This case study highlights that diversification of enterprises and continuous technical guidance from KVKs, is an effective strategy for income enhancement and sustainable rural development.

Way Forward

- Expansion of fruit-based and integrated enterprises
- Adoption of protected cultivation technologies
- Farmer-to-farmer extension for scaling



Fig 2.1 Intercropping of potato and cabbage and sweet corn in orchard and fish production

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

2.2 SOLAR-POWERED IRRIGATION AS A CATALYST FOR FARM PRODUCTIVITY AND INCOME ENHANCEMENT

Profile of the farmer

Name: Mr. Jai Nath Munda, Age: 46 years, Address: Khakhara, Post: Maganpur, Block: Gola, District: Ramgarh, Mobile No.: 9973285814, Education: Graduate, Farming experiences: 25 years, an a recipient of district Level Best Farmer Award.

Situation Analysis / Problem Statement

Mr. Jai Nath Munda, a tribal farmer from Ramgarh district, was facing acute irrigation constraints and was dependent on traditional cultivation practices. Due to the absence of assured



irrigation, poor crop planning, and limited use of modern farm inputs, nearly 3.0 acres of his land remained uncultivated. These constraints resulted in low productivity, high vulnerability to climatic risks, and limited farm income.

Plan, Implementation and Support / Interventions

Under the Government of India's PM-KUSUM Yojana, Mr. Munda obtained a solar irrigation pump, which ensured reliable and cost-effective irrigation. Technical guidance, capacity building, and continuous handholding were provided by Krishi Vigyan Kendra, Ramgarh, enabling the farmer to transition from subsistence farming to scientific and market-oriented cultivation. Based on local agro-climatic suitability, he diversified into early-season vegetable crops such as pea, potato, and cauliflower, along with maize cultivation.

Details of Practices Followed by the Farmer

- Use of solar pump for assured and timely irrigation
- Scientific land preparation and crop planning
- Early sowing of pea, potato, and cauliflower
- Adoption of improved and recommended varieties
- Balanced fertilizer application and use of organic manures
- Farm mechanization for timely operations
- Integrated pest and disease management practices

Results/ Output

The availability of assured irrigation combined with scientific crop management transformed previously barren land into productive farmland. Crop diversification and early-season vegetable cultivation enabled the farmer to harvest high-quality produce and access better market prices. As a result, Mr. Munda now earns an annual farm income exceeding ₹4.00 lakh, significantly improving household livelihood security and resilience.

Impact of Technology / Intervention

The adoption of solar-powered irrigation under PM-KUSUM, coupled with scientific and early-season crop cultivation practices, led to:

- Productive utilization of 3.0 acres of previously barren land
- Reduction in irrigation and energy costs
- Enhanced cropping intensity and diversification
- Substantial increase in farm productivity and profitability (>4.0 lakhs)

The intervention has ensured sustainable, climate-resilient, and profitable farming, demonstrating the transformative potential of renewable energy-based irrigation and KVK-led extension support for small and tribal farmers.

Lessons Learned and Future Plans

This success story underscores the critical role of assured irrigation, renewable energy solutions, and scientific crop management in enhancing farm productivity, income, and livelihood security, particularly for small and tribal farmers in rainfed and resource-constrained areas. Encouraged by the positive outcomes, Mr. Jai Nath Munda plans to expand early-season

Table 2.2.1 : Impact of Intervention

Particulars	Before Intervention (Traditional Practices)	After Intervention (Solar Irrigation & Scientific Farming)	Impact / Outcome
Irrigation Facility	No assured irrigation; rain-dependent	Solar irrigation pump under PM-KUSUM	Assured & timely irrigation
Cultivable Area	Only ~2.0 acres cultivated	Entire 5.0 acres cultivated	3.0 acres fallow land brought under cultivation
Cropping Pattern	Limited seasonal crops	Early pea, potato, cauliflower & maize	Crop diversification
Cropping Intensity	Low (single/seasonal crop)	High (early & multiple crops)	Increased land use efficiency
Cost of Irrigation	High (diesel/electricity)	Very low (solar-powered)	Reduced cost of cultivation
Technology Adoption	Traditional methods	Improved varieties, mechanization, IPM	Higher productivity
Market Realization	Normal market price	Premium price (early-season crops)	Higher returns
Annual Farm Income (Rs)	~1.5–2.0 lakh	>4.0 lakh	More than double income
Net Profitability	Low and uncertain	High and stable	Improved economic security
Socio-economic Status	Weak financial condition	Improved livelihood & stability	Better quality of life

Table 2.2.2 : Enterprise-wise Economic Details

Enterprises/Crops	Area (Acre)	Season	Gross Income (Rs.)	Remark
Pea	1.5	Rabi (Early)	1,80,000	High market price due to early harvest
Potato	1.5	Rabi	1,20,000	Assured irrigation increased yield
Cauliflower	1.0	Rabi (Early)	90,000	Premium price in early season
Maize	1.0	Kharif	60,000	Additional assured income
Total	5.0	–	4,50,000	Sustainable annual income

vegetable cultivation, further adopt advanced farm mechanization, and continue improving production efficiency. He also aims to motivate fellow farmers in the village to leverage government initiatives such as PM-KUSUM and seek technical support from KVKs for achieving sustainable, climate-resilient, and profitable agriculture.



Fig 2.2 Vegetable cultivation using solar irrigation

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

2.3 SCIENTIFIC VEGETABLE- BASED FARMING SYSTEM AND IPM FOR INCOME ENHANCEMENT NEAR FOREST ECOSYSTEMS

Profile of the farmer

Name: Mr. Balchand Mahto, Age: 47 years, Address: Chainpur, Block: Mandu, District: Ramgarh (Jharkhand), Mobile No.: 9693108801, Education: 12th, Farming experience: 25 years.

Situation Analysis/ Problem Statement

Mr. Balchand Mahto cultivates 3.5 acres of land near a forest fringe area in Chainpur village of Mandu block, where vegetable cultivation forms the backbone of his livelihood. Over the years, frequent pest and disease outbreaks—particularly in brinjal, tomato, and chilli—led to declining productivity, unstable income, and increased production risks.

Major constraints affecting his farming system included:

- High pest pressure and disease incidence due to lack of resistant varieties.
- Reliance on traditional practices, resulting in crop losses.
- Inadequate pest management strategies, leading to inconsistent yields.
- Poor market timing, affecting price realization.

These challenges severely constrained profitability and threatened long-term livelihood security.

Plan, Implementation and Support / Interventions

During a routine KVK, Ramgarh advisory field visit, scientists identified pest and disease pressure as the major production constraint. A need-based scientific intervention plan was



designed to transform his traditional vegetable farming into a scientifically managed, market-oriented enterprise.

Key support measures included:

- **Training Programs:** Participated in hands-on training on scientific vegetable cultivation, nursery management, integrated nutrient and water management, Integrated Pest Management (IPM), and marketing strategies.
- **Technical Backstopping:** Continuous guidance from KVK scientists to ensure timely adoption of improved practices.
- **Exposure Visits:** Visits to KVK demonstration units significantly enhanced his confidence and provided him with valuable hands-on practical knowledge.
- **Advisory Support:** On-field advice for pest monitoring, varietal selection, and intercropping strategies.
- **IPM Interventions:** Installation of pheromone traps and yellow sticky traps for pest monitoring and management, use of marigold as a trap crop, regular field scouting, and need-based pesticide application based on Economic Threshold Levels (ETL).

These interventions helped Mr. Mahto shift from traditional practices to knowledge-based, input-efficient, and profitable vegetable farming.

Details of Practices Followed by the Farmer

- **Use of Resistant Varieties:** Planted Swarna Shyamali and Swarna Pratibha (brinjal), Swarna Sampada (tomato), and Swarna Praphulya (chilli) to reduce losses due to bacterial wilt and other diseases.
- **Quality Nursery Management:** Raised healthy seedlings using quality potting media under timely transplantation schedules.
- **Intercropping & Ecological Pest Management:** Grew palak (Spinach) alongside brinjal to increase income; marigold as a border crop helped suppress pests naturally.
- **Integrated Pest Management (IPM):** Use of pheromone traps and yellow sticky traps for pest monitoring, adopted marigold as a trap crop, practiced regular field scouting, removal of infested plant parts, and need-based pesticide application based on pest incidence.
- **Timely Harvesting and Early Market Entry:** Ensured higher prices and continuous supply up to January.
- **Enterprise Diversification:** Integrated goatery and dairy enterprises to supplement income and improve resilience.

Results/Output

- **Higher Yields:** Significant improvement in brinjal, tomato, and chilli productivity.
- **Improved Quality:** Marketable vegetables with better appearance and shelf life.
- **Consistent Market Supply:** Early harvesting and off-season production ensured continuous income.
- **Model Farm:** The farm became a local example of scientific vegetable cultivation, inspiring other farmers.
- **Reduced Pest Losses:** Resistant varieties and IPM practices significantly reduced pest

and disease incidence.

- **Reduced Pesticide Use:** Need-based plant protection lowered pesticide uses and cultivation costs.
- **Enhanced Income:** Annual net income increased from Rs. 2.88 lakh to Rs. 5.10 lakh.

Impact of Technology / Intervention

KVK interventions significantly improved farm profitability. Diversification with vegetables, goatery, and cattle rearing increased resilience and income. The net annual income increased to Rs. 5.10 lakhs, reflecting a substantial household income stability and food security.

Table 2.3 : Enterprise-wise Economic Details

Crop / Enterprise	Area (Acre) / No.	Production (Before)	Production (After)	Net Income – Before (Rs.)	Net Income – After (Rs.)
Rice	1.50	32.00 q	42.00 q	38,000	54,000
Pulses	0.50	3.20 q	4.50 q	14,000	22,300
Oilseeds	0.30	2.80 q	4.30 q	12,500	20,200
Vegetables	1.20	140.00 q	210.00 q	1,95,000	3,65,000
Cattle	3 Nos.	450.00 lit	700.00 lit	15,000	25,000
Goatery	5 Nos.	38.00 kg	62.00 kg	13,500	23,000
Total Net Annual Income				2,88,000	5,09,500

Lessons Learned and Future Plans

Mr. Balchand Mahto's experience highlights that

- Scientific pest and disease management, along with resistant varieties, can transform vegetable farming into a highly profitable enterprise.
- Early harvesting and early market access maximize income.
- Integrated farming with livestock enhances resilience and diversifies income streams.

Future Plans

- Expand vegetable cultivation and off-season production.
- Strengthen integrated farming systems, including poultry and goatery.
- Mentor fellow farmers, sharing his knowledge on IPM and scientific vegetable cultivation.

His success has already inspired nearly 100 farmers in Chainpur village, transforming the area into a district-level hub for tomato and brinjal production.



Fig 2.3 Performance of groundnut crop in Balchand Mahto's field, Chainpur, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

2.4 TRANSFORMING UNPRODUCTIVE WETLANDS INTO A THRIVING AQUACULTURE ENTERPRISE

Profile of the farmer

Name: Mr. Tripurari Chaudhary, Age: 66 years, Address: Sakrauli Buchauli, Block: Jandaha, District: Vaishali (Bihar), Mobile: 9934913677, Education: B.Sc., Farming Experience: 30 years

Situation Analysis / Problem Statement

Wetlands (locally known as chaur) remain waterlogged for most of the year due to prolonged inundation, making them unsuitable for conventional agriculture and often economically unviable. Mr. Chaudhary, who owned about 10.0 acres of wetland, initially struggled with low aquaculture productivity and limited income from his chaur land. The absence of appropriate technologies and scientific management posed a major challenge in converting these flood-prone wetlands into a sustainable livelihood source. Recognizing the potential of aquaculture as a viable alternative, Mr. Chaudhary sought scientific guidance to develop a sustainable, profitable, and resilient wetland-based farming system.

Plan, Implement and Support/Interventions

Mr. Chaudhary initiated aquaculture interventions in a phased and science-led manner:

- Started aquaculture on 2.0 acres of wetland with technical guidance from ICAR–National Dairy Research Institute (NDRI), Karnal in the year 1990.
- Adopted low cost hapa breeding technique for fish seed production-using hypophysation (hormone injection) within hapas (enclosed nets) instead of constructing expensive eco-hatcheries.



- Received continuous scientific and technical support from ICAR–Research Complex for Eastern Region (ICAR-RCER), Patna, particularly for:
 - (a) Hatchery development- In 2006, installed eco-hatchery in Fibre-reinforced Plastic (FRP) tanks with technical support from ICAR-RCER, Patna, and later FRP tanks were replaced with large cemented tanks (a 100 kg breeding tank and four spawning tanks of one million capacity each) for high-quality seed production.
 - (b) Disease diagnosis and management.
 - (c) Broodstock improvement and quality seed production-Improved broodstock using Ganga river seeds, and produced high-quality fish seed, boosting his farm income.
- Gradually expanded operations by adopting an Integrated Farming System (IFS) approach, combining aquaculture with crops, horticulture, livestock, and allied enterprises.

This long-term institutional support played a critical role in scaling up operations and ensuring sustainability

Details of Practices Followed by the Farmer

♦ Fish Breeding Technologies

- Initial adoption of hypophysation breeding technique using hapa for Indian Major Carps (Rohu, Mrigal, Grass Carp)
- Upgradation to eco-hatchery systems using Fibre Reinforced Plastic (FRP) tanks, followed by cement tanks

♦ Broodstock Management

- Periodic sourcing of wild broodstock from the River Ganga to prevent inbreeding depression and maintain genetic vigor

♦ Integrated Farming System

- Fish culture integrated with paddy, wheat, maize, and horticultural crops such as mango, guava, and banana
- Inclusion of livestock and mushroom cultivation for additional income streams

♦ Fish Health and Disease Management

- Adoption of preventive and curative disease management strategies under ICAR-RCER guidance

♦ Marketing and Seed Distribution

- Direct marketing of live fish seed to distant districts using aeration-supported transport systems, ensuring high survival

Results/Output

- Achieved year-round aquaculture production in flood-prone wetland ecosystems
- Regular production of high-quality fish seed of Indian Major Carps and exotic carps
- Established a recognized fish seed production unit, “Chaudhary Matsya Beej Kendra”, under ICAR-RCER guidance
- Expanded farm operations to 15 acres, including 10 ponds covering 10 acres and a modern hatchery facility
- Supplies quality fish seed to more than 15 districts of Bihar
- Generated regular employment for at least 6 persons and seasonal employment for over 25 persons

Impact of Technology/Intervention

Scientific aquaculture and integrated farming interventions resulted in a dramatic improvement in income and livelihood security:

- Gross annual income increased from Rs. 10 lakh (2010–11) to nearly Rs. 40 lakh (2025–26)
- Profits from aquaculture enabled higher education of both sons, who pursued medical degrees, reflecting long-term socio-economic upliftment
- Diversification through integrated farming significantly reduced vulnerability to climatic shocks and market fluctuations

Enterprise-wise Economic Details

- **Fish Seed Sales:** Rs. 700–800 per lakh spawns during breeding season.
- **Table Fish Sales:** Rs. 200 per kg, sold year-round from grow-out ponds.
- **Integrated Farming Components:** Additional revenue of 1.5 lakh from crops, fruits, vegetables, livestock, and mushrooms.

Income Change

- Before intervention: Net income ~ Rs. 10 lakh/year
- After intervention: Net income ~ Rs. 40 lakh/year

Lessons Learned and Future Plans

- Aquaculture has immense potential to convert unproductive wetlands into profitable and sustainable enterprises
- Continuous scientific guidance and capacity building are crucial for scaling and long-term success
- Integrated farming systems enhance income stability and resilience against climate and market risks

Mr. Chaudhary's journey stands as a flagship example of science-led wetland transformation, demonstrating how unproductive chauras can be converted into high-income, employment-generating aquaculture hubs through sustained ICAR support. His success provides a scalable model for wetland-based livelihood development across eastern India.

Future Plans

- Further expansion of hatchery capacity
- Diversification into additional high-value fish species
- Strengthening backward and forward linkages for seed and table fish marketing



(Contribution: Tarkeshwar Kumar, Kamal Sarma, S.K.Ahirwal and Vivekanand Bharti, ICAR RCER, Patna)

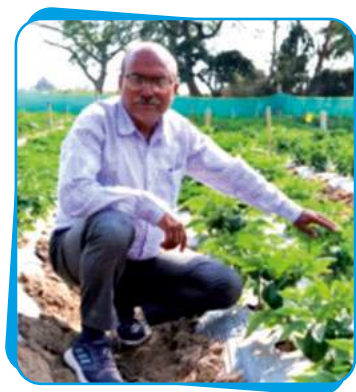
2.5 DIVERSIFIED VEGETABLE BASED FARMING BOOSTED INCOME AND SUSTAINABILITY: A SUCCESS STORY FROM BUXAR

Profile of the Farmer

Name: Mr. Ashutosh Panday, Address: Naya Bhojpur, Block: Dumraon, District: Buxar, Bihar, Mobile: 9431682188

Background and Situation Analysis

Mr. Ashutosh Panday began his professional journey as a Marketing Manager in a reputed corporate company in Delhi after completing his Master's degree in Management. However, due to family responsibilities, he left his decade-long corporate career and returned to his native village to pursue farming as a sustainable livelihood. Initially, he cultivated seasonal vegetables such as potato, beans, vegetable cowpea, and off-season coriander using conventional practices with chemical fertilizers, achieving only average productivity. His turning point came when he attended training programme conducted by Krishi Vigyan Kendra (KVK) on from diversification. Inspired by the demonstrated results and long-term benefits, he decided to adopt diversified vegetable based farming practices on his field.



Technologies Promoted and Institutional Support

KVK, Buxar provided modern scientific cultivation of vegetable production and strengthen his skill through capacity development programme and exposure visit, technical guidance and on-field support. Mr. Ashutosh Pandey adopted modern skill of vegetable production, and application of quality inputs, including:

- ✓ Raised bed vegetable production of improved vegetable varieties
- ✓ Used poly mulch for weed control and drip irrigation for soil enrichment
- ✓ Balance application of fertilizer and micro nutrient
- ✓ Applied Integrated Pest management practices
- ✓ KVK provided market linkages with FPOs

Specialist from KVK, Buxar visited on regular interval at his farm and provided need-based agro-advisory services to optimize crop production at desired scale. He successfully adopted round-the-year vegetable cultivation using poly mulch and drip irrigation, applying seed treatment with carbendazim and Imidacloprid, raised bed nursery, timely transplanting and weed management through poly mulch. Application fertilizers and micronutrient through drip irrigation, regular monitoring of pest and diseases. etc

Economic Impact of Technological Interventions

Adoption of diversified vegetable farming practices and correct way of farming resulted in a significant increase in yield as well as income.

Change in Income

Before Adoption (Conventional Farming – 2021): Rs. 5,13,900

After Adoption (vegetable Farming – 2022–2024) : As a result of diversified vegetable based farming practices, significant yield improvement as well as increase in BC ratio was observed during 2022–2024. Specially, there was significant yield advantage in case of

watermelon and muskmelon by around 60%. The annual average income after adoption of diversified farming is listed below:

- Average Income (Kharif): Rs. 4,43,000
- Average Income (Rabi): Rs. 3,61,500
- Average Income (Summer): Rs. 3,10,000

Total Annual income: Rs. 11,14,500 from an area of 3 acres

This reflects a remarkable rise in profitability, demonstrating the economic viability of vegetable farming.

Enterprise wise economic details

Table 2.5.1 : Production of vegetables and economics in conventional farming (2021)

SI. No.	Crops	Production (qt/acre)	Cost of cultivation	Gross Return	Net Return	BCR
			In Rupees/ Acre			
1	Cowpea	50	15200	50000	21800	3.28
2	Cauliflower	95	42500	85500	43000	2.02
3	Potato	98	44800	98000	53200	2.18
4	Papaya	210	63797	252000	197600	3.95
5	Tomato	195	62000	136500	74500	2.20
6	Water melon	148	56300	118400	62100	2.10
7	Musk melon	112	61500	123200	61700	2.00
Total Net return RS./ Annum					513900	

Table 2.5.2 : Season wise average production and income from diversified vegetable-based farming (2022-2024)

Kharif Season						
SI. No.	Production on broad bed with polymulch	Production (qt/acre)	Cost of cultivation	Gross Return	Net Return	BCR
			In Rupees/ Acre			
1	Cow pea	60	30000	90000	60000	3.0
2	Papaya	250	68000	375000	307000	5.51
3	Cauliflower	120	68000	144000	76000	2.11
Average Income (Kharif Season)					443,000	-

Rabi Season						
1	Brinjal	90	70000	180000	110000	2.57
2	Tomato	240	80000	240000	160000	3.0
3	Potato	124	57300	148800	91500	2.59
Average Income (Rabi Season)					361500	-
Summer Season						
1	Water melon	240	100000	240000	140000	2.4
2	Musk melon	180	100000	270000	170000	2.7
Average Income (Summer Season)					31,0000	-
Average annual income (Kharif + Rabi + Summer)					1,114,500	-

Impact and achievements

- Annual income increased by more than 100% after adoption of diversified vegetable-based farming.
- Hon'ble MPs, MLAs, university officials, and departmental dignitaries visited this farm.
- Generated local employment and strengthened awareness of eco-friendly agriculture.
- Recognized as a model farm for vegetable farming promotion. Over 1,500 farmers, students, and agricultural professionals have visited his farm to learn about crop diversification practices. He now plays a pivotal role in disseminating eco-friendly and low-cost technologies among fellow farmers.

Learnings and Way Forward

Through continuous learning and experimentation, Mr. Panday developed expertise in intercropping, mulching, livestock integration, and crop residue recycling to enhance soil fertility. His determination to achieve higher farm income has set a motivating example for farmers to move beyond conventional practices, adopt innovative approaches, and create sustainable livelihood opportunities. His efforts have also generated local employment and strengthened community awareness about environmentally responsible agriculture. His success demonstrates that crop diversification not only enhances income but also restores soil health and promotes long-term ecological balance—paving the way for resilient and profitable farming systems. Such models must be promoted to other suitable area ad Govt. should support in their development.



Fig 2.5.1 Grading of the fruits for marketing



Fig 2.5.2 Visit of the Local MP in Mr Pandey's field

(Contribution: Deokaran, Ramkewal & Harigovind, ICAR-RCER, KVK, Buxar)

2.6 FROM CONVENTIONAL FARMING TO CLIMATE-SMART DIVERSIFICATION: THE TRANSFORMATION OF A MARGINAL FARMER

Profile of the Farmer

Name: Mr. Jeet Bahadur Yadav, Age: 33 years, Address: Dalsagar, Post: Dalsagar, Block & District: Buxar, Bihar, Mobile: 9097543449, Education: Intermediate, Farming Experience: 10 Years

Background and Situation Analysis

Mr. Jeet Bahadur Yadav is a marginal farmer owning 1 hectare of land and cultivating an additional 1 hectare on lease, making a total operational holding of 2 hectares. He was primarily engaged in growing cereals, oilseeds, pulses, and vegetables, along with maintaining two milking cows and one buffalo. Prior to the implementation of the Climate Resilient Agriculture (CRA) Programme by ICAR-RCER Krishi Vigyan Kendra (KVK), Buxar, he followed conventional practices such as broadcasting of seeds and flat-bed planting. Most of his produce was sold directly from the field without value addition or planned marketing. Due to low productivity and limited exposure to improved technologies, his annual income remained insufficient to meet household requirements.



Institutional Support and Interventions

Recognizing his potential, Krishi Vigyan Kendra (KVK), Buxar selected Mr. Yadav under the CRA Programme in 2020 and provided structured training on best management practices in cereal and vegetable production. KVK promoted farm mechanization and supported him with modern implements such as:

- Multi-crop planter
- Seed drill
- Zero-till drill
- Happy seeder
- Laser land levelling

He was encouraged to adopt scientific practices including line sowing, raised bed planting,

zero-tillage wheat cultivation, seed drilling for chickpea and mustard, crop residue management, and systematic crop planning for round-the-year vegetable production. Continuous handholding, demonstrations, exposure visits, and advisory services ensured successful adoption of improved practices.

Technologies and Practices adopted

With continuous technical guidance from KVK, Mr. Yadav transitioned from traditional to scientific farming by adopting:

- ✓ Laser land levelling
- ✓ Line Sowing of climate resilient crop varieties for proper spacing and higher yield.
- ✓ Raised bed planting for vegetables like tomato, chilli, and cauliflower
- ✓ Zero tillage for wheat and chickpea to reduce cost of cultivation
- ✓ Mechanized sowing for improved efficiency
- ✓ Foliar application of NPK in vegetables, particularly in kharif season to reduce the cost of inputs and enhanced fertilizer use efficiency.
- ✓ Intercropping (e.g., cauliflower with spinach)
- ✓ Year-round diversified vegetable cultivation

Economic details of Technological Interventions

KVK's support through training, demonstrations, exposure visits, and continuous handholding significantly strengthened his farm enterprise. Scientific cultivation of vegetables—particularly line sowing of vegetable pea (Var. Azad Pea-3), intercropping of cauliflower with spinach, zero-tillage moong bean, and diversified year-round vegetable farming—resulted in higher yields, reduced production costs, and improved benefit–cost ratios. Before the intervention (2019–20), his total annual income was approximately Rs. 2.83 lakh from crops and livestock. After adopting scientific practices under the CRA Programme (2024–25), his net annual income increased to Rs. 7.44 lakh, reflecting more than a twofold rise in profitability.

Before interventions: **Rs. 2.83 lakh annually**

After interventions: Season-wise Net Income

- Kharif: Rs. 3,53,750
- Rabi: Rs. 3,70,580
- Summer: Rs. 20,500

Grand Total Net Income: **Rs. 7,44,830**

The income growth was primarily driven by raised bed vegetable cultivation, timely line sowing, mechanization, and improved crop management practices

Impact of the interventions

- More than doubled his annual income through scientific vegetable production.
- Enhanced farm efficiency with mechanization and improved crop planning.
- Strengthened household economic security and living standards.
- Emerged as a progressive farmer motivating others to adopt improved technologies.

Key leaning and way forward

Initially, Mr. Yadav faced several socio-economic challenges related to family education, health, and financial stability. However, participation in the CRA Programme gradually

improved his livelihood and overall quality of life. Today, his children are studying in a convent school, reflecting the positive socio-economic transformation achieved through scientific farming. Encouraged by his success, he plans to further expand vegetable cultivation, adopt advanced technologies, and continue improving farm productivity for sustainable income growth.

The journey of Mr. Jeet Bahadur Yadav demonstrates how scientific interventions, mechanization, and institutional support can significantly enhance farm income for smallholders. His transformation from conventional farming to diversified vegetable production highlights the potential of technology-led agriculture in improving livelihoods and ensuring long-term sustainability.

Table 2.6.1 : Production and economics of crops under farmer practice in 2019-20 (before)

Crops and other Enterprises	Area (ha.)	Farmer practice	Yield (qt)	Net Income (Rs)
Rice	1.0	Transplanting	45.0	42857
Bajra	0.5	Broadcasting	16.4	25160
Wheat	1.5	Broadcasting	64.0	70660
Lentil	0.25	Broadcasting	03.0	11000
Chickpea	0.25	Broadcasting	04.0	14800
Tomato	0.50	Flat bed	88.0	85200
Cow	-		1800 ltr	33400
Total	2.0	-	-	2,83,077

Table 2.6.2 : Production and economics of interventions under taken during 2024-25 (after)

After Intervention								
Kharif Season								
SI. No.	Crop	Area (ha)	Intervention	Production (qt/acre)	Cost of cultivation	Gross Return	Net Return	BCR
					In Rupees/ Acre			
1	Okra	1.0	Furrow irrigated raised bed system	140	90000	280000	190000	2.11
2	Chilli	0.5	Raised Bed	75	55000	187500	137500	2.48
3	Bajra	0.5	Line sowing	18.5	9000	40205	31250	3.47
	Total	2.0	-	-	-	-	-	-
Net Income (Kharif Season)							3,53,750	-

Rabi Season								
1	Tomato	0.25	Raised bed	48	23000	120000	97000	4.21
2	Cauli flower	0.25	Raised bed	55	26550	142000	115450	4.34
3	Vegetables pea	0.25	Line sowing	35	25640	122000	96360	3.75
4	Wheat	0.25	Zero tillage	11.2	8256	29880	21624	2.61
5	Chickpea	0.20	Zero tillage	4.28	4526	18622	14096	3.11
6	Sugar beet	0.20	Line Sowing	53	6100	32150	26050	4.27
	Total	1.40	-	-	-	-	-	-
Net Income (Rabi Season)							3,70,580	-
Summer Season								
1	Mung Bean	0.60	Line Sowing	4.00	9500	30000	20500	2.15
Net Income (Summer Season)							20,500	-
Grand Total Rs (Kharif + Rabi + Summer)							7,44,830	-



Fig 2.6.1 Zero Tillage sowing of Moong bean Var. Virat



Fig 2.6.2 Performance of Vegetable Pea Var. Azad Pea-3



Fig 2.6.3 Inter Cropping of Cauliflower and Spinach



Fig 2.6.4 Line sowing of Vegetable Pea Var. Azad Pea-3

(Contribution: Deokaran, Ramkewal, Harigovind and Ravi Chaterjee, ICAR-RCER, KVK, Buxar)



3.1 FROM FARM TO FOREIGN MARKET: HIGH-VALUE INCOME THROUGH INTEGRATED FARMING SYSTEM

Profile of the farmer

Name: Mr. Rachiya Mahto, Age: 41 years, Address : Sarlakala, Post : Sangrampur, Block : Gola, District : Ramgarh, Education: Intermediate, Mobile No.: 7992437524, Farming Experiences: 22 years, recipient of ICAR Progressive Farmer Award and State Level Krishi Pradarshini Award

Situation Analysis / Problem Statement

Mr. Rachiya Mahto was earlier practicing traditional methods of farming with limited crop diversification and low profitability. The absence of scientific planning and integration of farm enterprises led to sub-optimal utilization of land, water, and other resources, resulting in moderate and uncertain farm income.

Plan, Implementation and Support / Interventions

Through continuous interaction, capacity building, and on-farm advisory support from KVK scientists, he gradually adopted the IFS approach by integrating crop production, horticulture, fishery, livestock, and poultry enterprises. The holistic integration of enterprises enabled efficient recycling of farm resources, reduction in production costs, and diversification of income sources, thereby improving overall farm sustainability and profitability.

Details of Practices Followed by the Farmer

- Adoption of Integrated Farming System (IFS) model with integration of crop-horticulture-fish-livestock-poultry
- Pond-based farming (1 acre) integrated with fish culture
- Scientific cultivation of vegetables and high-value crops (strawberry, broccoli, sweet corn, etc.)
- Crop diversification with vegetables, fruits, livestock, and poultry
- Efficient recycling of farm resources within the IFS system

Results / Output

The adoption of the IFS model ensured year-round income generation from multiple farm enterprises. A significant achievement of the intervention was the successful export of strawberry produce to Dubai, generating an income of Rs. 2.75 lakh through international marketing, highlighting the superior quality, safety, and market competitiveness of the produce. Overall, the diversified farming system substantially enhanced farm resilience, productivity, and income stability.

Impact of Technology / Intervention

Adoption of the Integrated Farming System (IFS) led to substantial enhancement in farm productivity, diversification of income, reduced production risk, and access to high-value domestic and international markets. The intervention transformed farming into a highly

profitable and sustainable enterprise, generating more than Rs. 10 lakh annual net income with an area of 15 acre and significantly improving the socio-economic status of the farmer and his family.

Particulars	Before Intervention (Traditional Farming)	After Intervention (Integrated Farming System)	Impact / Outcome
Farming System	Single/limited enterprises	Integrated Farming System (crop-horticulture-fish-livestock-poultry)	Diversification of income sources
Crop Planning	Poor diversification, seasonal crops	Scientific planning with high-value crops	Efficient land use
Technology Adoption	Traditional practices	Scientific cultivation, IFS, resource recycling	Higher productivity
Resource Utilization	Sub-optimal use of land & water	Efficient recycling within IFS	Reduced cost of production
Risk Management	High risk due to mono-cropping	Risk reduced through multiple enterprises	Income stability
Market Orientation	Local markets only	Domestic & international markets (strawberry export)	Better price realization
Annual Gross Income (Rs.)	~3.0–4.0 lakh	>21.0 lakh	Significant increase
Annual Net Income (Rs.)	Low & uncertain	>10.0 lakh	Sustainable livelihood
Employment Generation	Limited	Year-round family employment	Improved livelihood security
Socio-economic Status	Moderate	Improved standard of living & recognition	Enhanced farmer prosperity

Table 3.1 : Enterprise-wise Economic Details

Sl. No.	Enterprise	Area (acres)	Annual Gross Income (Rs. in lakh)	Remarks
1	Tomato	2.0	2.50	Scientific vegetable cultivation
2	Potato	0.30	1.00	High return from small area
3	Brinjal	0.25	0.25	Diversified vegetable crop

4	Broccoli	0.9	0.50	High-value vegetable
5	Strawberry	1.0	4.75	Exported to Dubai
6	Okra	2.0	0.27	Seasonal income
7	Sweet Corn	1.0	4.60	Market-oriented cultivation
8	Fishery	1 acre pond	4.00	Pond-based integrated farming
9	Cattle & Goat Rearing	0.1	0.50	Livestock integration
10	Duck Egg Production	—	1.50	Regular income
11	Poultry	—	0.40	Supplementary income
12	Mango Orchard	5	1.00	Perennial income
Total	—	15	21.27 lakh	Multi-enterprise IFS income

Lessons Learned and Future Plans

This success story demonstrates the potential of the Integrated Farming System in converting traditional, low-profit farming into a resilient and market-oriented enterprise. Encouraged by the outcomes, Mr. Rachiya Mahto plans to further expand high-value horticultural crops, strengthen value addition and market linkages, and act as a progressive farmer and local resource person to motivate fellow farmers to adopt IFS-based farming for sustainable and remunerative agriculture



Fig 3.1 Strawberry cultivation on poly mulching with fertigation and grading and sorting for marketing at village Sarlakala, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

3.2 ENTERPRISE DIVERSIFICATION THROUGH SCIENTIFIC FARMING FOR LIVELIHOOD SECURITY

Profile of the farmer

Name: Sri Balgovind Mahto, Age: 55 years, Address: Bargaon, Block: Mandu, District: Ramgarh (Jharkhand), Education: 10th Pass, Mobile No.: 7209597795, Farming experience: 40 years



Situation Analysis / Problem Statement

Mr. Balgovind Mahto, with over 40 years of farming experience, owned a small farm where traditional paddy-based cultivation was the primary source of livelihood. Before intervention, nearly 70% of the cultivated area was occupied by paddy, resulting in low cropping intensity, limited enterprise diversification, and unstable farm income. Lack of awareness about scientific vegetable cultivation, balanced nutrient management, improved varieties, and livestock-based integrated farming led to low productivity and inefficient resource utilization. Rising input costs and dependence on a single crop further increased production risks and constrained annual farm income, affecting the livelihood security of the family.

Plan, Implementation and Support / Interventions

Mr. Mahto received systematic training, demonstrations, and continuous technical support from Krishi Vigyan Kendra, Ramgarh. The major interventions included:

- Skill-oriented training on improved paddy cultivation, scientific vegetable production, and the Integrated Farming System (IFS) approach
- Frontline demonstrations on nutrient management, pest and disease management, and use of improved crop varieties
- Capacity building programmes on goat rearing and dairy management, including housing, feeding, and health care
- Regular field visits, technical backstopping, and need-based advisory services by KVK scientists

Details of Practices Followed by the Farmer

- Improved paddy varieties along with recommended agronomic practices, resulting in about 20–25% higher productivity.
- Diversified the farming system with high-value vegetables such as cauliflower, cabbage, and bottle gourd, increasing farm income and cropping intensity.
- Applied balanced fertilizers and followed timely plant protection measures, contributing to 15–20% improvement in crop yields and better produce quality.
- Practiced scientific goat rearing with improved housing, feeding, and health management, leading to 30–35% higher returns from livestock.
- Integrated crop and livestock enterprises for efficient recycling of farm resources, reduced production risk, and enhanced year-round income generation.

Results / Output

- Crop productivity increased by 25–30% through the adoption of improved varieties and scientific crop management practices.

- Vegetable cultivation increased cropping intensity and contributed nearly 35–40% of total farm income.
- Balanced nutrient management and timely plant protection improved produce quality and marketability.
- Scientific goat rearing enhanced livestock productivity and increased income from the enterprise by 30–40%.
- Adoption of the Integrated Farming System reduced production risks and ensured year-round income generation.
- Annual net income increased from about Rs. 1.0 lakh to over Rs. 2.0 lakh, registering an increase of more than 100%.

Impact of Technology / Intervention

The adoption of scientific crop management, enterprise diversification, and goat rearing under the Integrated Farming System, supported by KVK, Ramgarh, significantly enhanced farm productivity, reduced income risk, and increased annual net income to more than Rs. 2.00 lakh, ensuring sustainable and profitable farming for Mr. Balgovind Mahto.

Sri Mahto adopted a diversified enterprise-based farming system, integrating crops and livestock to enhance income stability, food security, and risk mitigation. The net income from major enterprises is presented below:

Enterprise-wise Economic Details

Sl. No.	Enterprise	Area / Unit	Net Income Before Intervention (Rs.)	Net Income After Intervention (Rs.)	Remarks
1	Paddy	1.5 acres	45,000	70,000	Improved variety and scientific management
2	Cauliflower	0.25 acre	Nil	45,000	High-value vegetable crop
3	Cabbage	0.25 acre	Nil	40,000	Crop diversification
4	Bottle gourd	0.20 acre	Nil	66,500	Short-duration, high profitability
5	Goat rearing	8 goats	Nil	57,000	Increased Income and quick return
Total	—	—	45,000	2,78,500	Integrated Farming System impact

Key Learnings and Future Plans

Key Learnings

- Scientific farming practices combined with enterprise diversification significantly enhance farm income and livelihood resilience.
- Continuous technical guidance, capacity building, and skill-based training are essential for achieving sustainability and long-term success in agriculture.

Future Plans

- Expansion of vegetable cultivation area to further increase farm profitability and market-oriented production.
- Increase in goat units and strengthening of dairy enterprises to enhance allied income sources and improve livelihood security.
- Acting as a resource farmer to motivate, mentor, and guide other farmers in the village through farmer-to-farmer extension and knowledge sharing.



Fig 3.2 Crop diversification through carrot, tomato and cauliflower cultivation at Bargaon, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

3.3 TRANSFORMING RAINFED FARMING INTO A PROFITABLE INTEGRATED FARMING MODEL THROUGH VERMICOMPOST AND DIVERSIFICATION

Profile of the farmer

Name: Mr. Om Prakash Manki, Age: 35 years, Address : Chatak, P.O: Dulmi, Block: Dulmi, District : Ramgarh, Jharkhand, Education: Diploma in Engineering, Mobile No.: 7903029083, Farming Experience: 15 years

Situation Analysis / Problem Statement

Mr. Om Prakash Manki, a progressive farmer from Chatak village of Ramgarh district, owns approximately 6.5 acres of agricultural land, a major portion of which is rainfed and highly vulnerable to climatic variability. Frequent crop failures occurred due to erratic monsoon rainfall, prolonged dry spells during



critical crop growth stages, inadequate irrigation facilities, and recurring moisture stress. These factors resulted in poor crop establishment, reduced yields, and recurring economic losses in both Kharif and Rabi seasons. Heavy dependence on monsoon-based mono-cropping, coupled with limited enterprise diversification and increasing climatic risks, made farming economically unstable. As a result, sustaining livelihood through conventional rainfed agriculture became increasingly difficult. Recognizing these challenges, Mr. Manki sought diversified and climate-resilient farming alternatives to enhance income stability and reduce production risks.

Plan, Implementation and Support / Interventions

Mr. Manki approached Krishi Vigyan Kendra (KVK), Ramgarh, where he received need-based technical guidance from KVK scientists. As part of capacity building, he participated in a five-day training programme on vermicompost production, which served as a major turning point in his farming journey. With continuous advisory support and motivation from KVK, he adopted scientific crop planning, off-season vegetable cultivation, and integrated farming system (IFS) approaches. Subsequently, he established a commercial vermi-compost production unit, which became operational within 5–6 months. In addition, he diversified his farm enterprises by integrating Early potato, Watermelon, Cucurbitaceous and solanaceous vegetables, Cabbage and cauliflower, Pea and okra, Onion and fruit trees along with two dairy cows and a fishery unit, ensuring year-round income generation.

Details of Practices Followed by the Farmer

- **Scientific Crop Production:** Adoption of improved varieties, line sowing/transplanting, balanced nutrient management, and recommended agronomic practices.
- **Off-Season Vegetable (cabbage & cauliflower) Production:** Cultivation of vegetables during off-season periods for higher market prices and increased profitability.
- **Vermicomposting:** Commercial production and utilization of vermicompost for improving soil health and reducing dependence on chemical fertilizers.
- **Quality Planting Material:** Use of high-yielding improved varieties, certified seeds, and scientifically raised healthy seedlings to ensure better crop establishment, higher productivity, and improved adaptability under local conditions.
- **Crop Diversification:** Integration of cereals, pulses, vegetables, and fruit crops to enhance cropping intensity and reduce production risks.
- **Integrated Farming System (IFS):** Integration of crop and fishery enterprises for efficient resource recycling and year-round income generation.
- **KVK-Based Advisory and Decision Support System:** Regular technical guidance, field visits, and need-based advisories from KVK Ramgarh for timely farm management decisions.

Results / Output

With continuous technical backstopping from KVK Ramgarh, Mr. Om Prakash Manki successfully transformed his farm into a diversified, resilient, and sustainable farming model. The integration of multiple farm enterprises ensured year-round income flow, reducing dependency on seasonal crops and rainfall. The vermi-compost production unit not only enhanced soil health and crop productivity but also generated local employment, engaging 4–5 persons on a full-time basis, thereby contributing to rural livelihood enhancement.

Impact of Technology / Intervention

After receiving training and adopting scientific and integrated farming practices, Mr. Manki now earns an annual income of Rs. 9,89,200. In addition, he achieved a cost saving of approximately Rs. 5,20,500 through on-farm production and utilization of vermi-compost, pulses, oilseeds, and vegetables. This significant reduction in input costs, coupled with diversified income sources, has substantially improved overall farm profitability, income stability, and livelihood security.

Enterprise-wise Economic Details

The major income sources of Mr. Om Prakash Manki include off-season vegetables, cereals

Table 3.3 : Income From Different Enterprises

Sl. No.	Enterprise	Area / Unit	Annual Income Before Intervention (Rs.)	Annual Income After Intervention (Rs.)	Incremental Income (Rs.)	Remarks / Key Benefits
1	Rice (Rainfed)	3.5 acres	1,40,000	—	—	Replaced largely by off-season vegetables due to low profitability
2	Chickpea & Pea	2.0 acres	90,000	1,20,000	30,000	Improved productivity through scientific practices
3	Watermelon & Cucurbitaceous Crops	0.5 acre	40,000	60,000	20,000	Seasonal cash crop with quick returns
4	Fruit Trees (Mango & others)	0.5 acre	25,000	40,000	15,000	Sustainable long-term income
5	Vegetables (Potato, Cabbage, Cauliflower, Okra, Onion)	3.5 acres	—	4,50,000	4,50,000	High-value crops; staggered harvesting; year-round income
6	Vermi-Compost Production Unit	Commercial unit	—	2,50,000	2,50,000	Input cost saving (~Rs. 5,20,500); soil health improvement; employment generation
7	Fishery	1 unit	—	69,200	69,200	Income diversification; efficient resource use
Total	System Yield	6.5 acres + units	2,95,000	9,89,200	6,94,200	Integrated Farming System ensures stability, sustainability & livelihood security

and pulses, fruits, vermicompost production, dairy, and fishery, which together contribute to enhanced farm income, employment generation, input cost reduction, and livelihood sustainability.

Lessons Learned and Future Plans

Lessons Learned

- Farm diversification significantly reduces both climatic and market-related risks in rainfed farming systems.
- Vermicompost production plays a dual role by lowering input costs and improving soil health, thereby enhancing long-term farm sustainability.
- Regular capacity building, skill-based training, and continuous scientific guidance from KVKs are critical for successful adoption of improved agricultural practices.
- Integrated farming systems (IFS) enable efficient resource recycling, income stability, and year-round livelihood security.

Future Plan

- Expansion of commercial vermicompost production to meet growing local demand and further reduce dependency on chemical inputs.
- Strengthening off-season vegetable cultivation, including improved crop planning, quality inputs, and better market linkages.
- Promotion of integrated farming models among rural youth through exposure visits, demonstrations, and farmer-to-farmer learning to encourage agripreneurship.



Fig 3.3 Vermicompost production and Off-season Vegetables cultivation in Village Chatak, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

3.4 WOMEN-LED FARM TRANSFORMATION THROUGH SCIENCE-BASED DIVERSIFICATION

Profile of the farmer

Name of the Farmer: Mrs. Sangeeta Devi, Age: 40 years, Address: Badkachumba, Panchayat: Majhlachumba, P.O., P.S. & Block: Mandu, District: Ramgarh (Jharkhand), Mobile No.: 8002868479, Education: 8th, Farming experience: 20 years

Situation Analysis / Problem Statement

Mrs. Sangeeta Devi, an experienced farm woman owning 4.0 acres of agricultural land, was engaged in diversified farming involving crops, livestock, and poultry. However, her farming system was predominantly based on traditional practices. Despite high input use, lack of scientific planning, limited access to improved crop varieties, imbalanced nutrient application, and inadequate pest and disease management resulted in low productivity, high cost of cultivation, and poor profitability. Limited exposure to modern technologies, absence of systematic technical guidance, and weak market orientation further constrained farm performance. Consequently, her diversified farming system could not ensure adequate income, livelihood security, or economic empowerment, underscoring the need for scientific interventions and continuous institutional support.

Plan, Implementation and Support / Interventions

After establishing linkage with Krishi Vigyan Kendra (KVK), Ramgarh, a comprehensive and need-based action plan was formulated to transform Mrs. Sangeeta Devi's traditional farming system into a scientifically managed, diversified, and income-oriented enterprise. Based on diagnosis of her farm situation, KVK scientists designed a holistic intervention strategy covering agriculture, horticulture, livestock, and poultry components. She was provided with regular on-campus and off-campus capacity-building trainings, frontline demonstrations, exposure visits, and season-long technical advisories on scientific crop production practices. Emphasis was laid on adoption of improved high-yielding varieties, scientific sowing methods, balanced and judicious use of FYM and fertilizers based on crop requirement, efficient water management, and integrated pest and disease management to reduce input cost and enhance productivity. In addition, KVK extended specialized technical support in animal husbandry, focusing on scientific poultry and livestock management, including housing, feeding and health care. Timely advisories through field visits, telephonic consultation, and problem-specific guidance ensured smooth implementation of recommended practices. Continuous monitoring, evaluation, and handholding support by KVK scientists played a crucial role in building her confidence, minimizing risks, and ensuring effective adoption of technologies. Sustained handholding by KVK scientists played a vital role in building confidence, minimizing risks, and ensuring effective adoption of technologies, ultimately leading to successful enterprise integration and income enhancement.

Details of Practices Followed by the Farmer (Point-wise)

- **Adoption of Improved Varieties:** Replaced traditional varieties with high-yielding and stress-tolerant varieties in rice (IR 64 DRT-1, Sahbhagi, Abhishek, CR Dhan 320, Swarna Unnat Dhan), pulses (Birsa Arhar-1, Pant Urd-31), oilseeds (PM-30), and vegetables (Swarna Sampada, Swarna Lalima, Swarna Praphulya, Swarna Shyamali, Swarna Sneha, Swarna Mukut, Arka Niketan, Shree Bhadra).



- **Scientific Crop Planning & Diversification:** Integrated cereals, pulses, oilseeds, vegetables, and root crops for risk reduction, soil health improvement, and year-round income.
- **Balanced Nutrient Management:** Applied FYM along with recommended fertilizers to maintain soil fertility and crop productivity.
- **Improved Irrigation Management:** Ensured timely, need-based irrigation through well and motor pump to avoid moisture stress.
- **Integrated Pest & Disease Management:** Adopted regular crop monitoring and need-based plant protection to reduce losses and chemical use.
- **Scientific Poultry Farming:** Practiced scientific broiler rearing with 1500 birds following recommended housing, feeding, vaccination, and biosecurity measures.
- **Improved Livestock Management:** Followed scientific feeding, hygiene, and basic health care practices for cattle.
- **Efficient Resource Utilization:** Utilized crop residues and animal waste effectively to reduce input costs and enhance sustainability.
- **Post-harvest Handling & Marketing:** Practiced proper harvesting and grading and sold produce through village and weekly markets for better price realization.
- **Continuous Technical Support:** Maintained regular interaction with KVK scientists and actively adopted advisories and trainings.

Results / Output

The adoption of scientific farming practices under the guidance of KVK, Ramgarh led to visible and measurable improvements in Mrs. Sangeeta Devi's farming system. Use of improved high-yielding and stress-tolerant crop varieties, along with balanced nutrient and water management, resulted in a substantial increase in crop productivity across cereals, pulses, oilseeds, and vegetables. The quality of produce improved significantly in terms of size, uniformity, and market acceptability, enabling better price realization. Implementation of integrated pest and disease management practices reduced the incidence of major pests and diseases, minimized crop losses, and lowered expenditure on plant protection chemicals. Efficient utilization of farm resources, including judicious use of inputs, irrigation, and on-farm organic resources, improved overall resource-use efficiency and reduced the cost of cultivation. Further, diversification of the farming system with high-value vegetable crops and scientific poultry farming emerged as a major success factor. Vegetable cultivation provided regular and higher income throughout the year, while poultry farming ensured quick returns and cash flow. The integrated farming system enhanced resilience, reduced production risk, and strengthened livelihood security.

Impact of Technology / Intervention

The scientific interventions and continuous technical support provided by KVK, Ramgarh resulted in a significant improvement in the economic performance of Mrs. Sangeeta Devi's farming system. Adoption of improved crop varieties, balanced nutrient management, efficient irrigation, and integrated pest and disease management led to higher productivity with optimized input use, thereby reducing the overall cost of cultivation across different enterprises. Diversification into high-value vegetable crops and scientific poultry farming further enhanced income by ensuring regular cash/ flow and better market returns. As a result, her annual net income increased to Rs. 4.75 lakhs ensuring economic stability, improved household livelihood security,

enhanced savings, and greater resilience against climatic and market uncertainties. The intervention also contributed to women empowerment through increased decision-making capacity and financial independence.

Table 3.4 : Enterprise-wise Economic Performance

Crop / Enterprise	Area (Acre) / No.	Net Income (Rs./Year) – Before Intervention	Net Income (Rs./Year) – After Intervention	Increase in Net Income (Rs.)
Rice	1.00	15,000	17,900	2,900
Pulses (Urd & Arhar)	0.30	8,000	11,000	3,000
Oilseeds (Mustard & Groundnut)	0.30	7,000	9,500	2,500
Vegetables	1.80	85,000	3,45,000	2,60,000
Cattle	4 Nos.	5,000	5,500	500
Poultry	1500 Nos.	12,000	86,000	74,000
Total	–	1,32,000	4,74,900	3,42,900

Lessons Learned and Future Plans

The success of Mrs. Sangeeta Devi clearly demonstrates that scientific farming practices, crop and enterprise diversification, and continuous technical guidance are key drivers of sustainable income enhancement in small and marginal farming systems. Her experience highlights that timely adoption of improved varieties, balanced input use, and integration of allied enterprises can significantly reduce risk, increase productivity, and improve profitability. Encouraged by the positive outcomes, she plans to expand vegetable cultivation with more high-value crops, enhance poultry capacity through scientific scaling, and adopt value addition and primary processing to further increase income and market competitiveness. She also aspires to serve as a role model and local resource person, motivating and guiding other farm women to adopt scientific agricultural technologies for sustainable livelihoods and women empowerment.



Fig 3.4 Improved brinjal cultivation by Mrs Sangeeta Devi, Mandu, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

3.5 SCIENTIFIC INTERVENTIONS RESHAPING FARMING SYSTEMS IN RAMGARH: A SUCCESS STORY OF INTEGRATED DIVERSIFICATION

Profile of the farmer

Name of the Farmer: Mr. Santosh Ganjhu, Age: 44 years, Address: Gargali, Block: Mandu, District: Ramgarh (Jharkhand), Education: 12th, Mobile No.: 7765850440, Farming experience: 21 years.

Situation Analysis / Problem Statement

Mr. Santosh Ganjhu, a progressive farmer from Mandu block of Ramgarh district, owns about 4.0 acres of agricultural land and was already practicing diversified farming with cereals, pulses, oilseeds, vegetables, and livestock. However, despite his hard work and enterprise diversification, farm income remained moderate and unstable. The major constraints included reliance on traditional cultivation practices, use of local crop varieties, imbalanced application of fertilizers, and non-scientific pest and disease management. These factors resulted in suboptimal yields, relatively high cost of cultivation with limited economic returns, and limited profitability, restricting the overall growth of his farming system

Plan, Implementation and Support / Interventions

To address these challenges, Mr. Ganjhu approached Krishi Vigyan Kendra (KVK), Ramgarh for technical support. KVK scientists provided need-based advisory services and facilitated his participation in several on-campus and off-campus training programmes related to crop production, vegetable cultivation, nutrient management, pest and disease control, and livestock management. Continuous monitoring, field visits, and technical backstopping motivated him to adopt scientific packages of practices, improved crop varieties, and integrated farming approaches, ensuring effective implementation at the field level.

Details of Practices Followed by the Farmer

With support from KVK, Mr. Ganjhu adopted high-yielding and disease-resistant varieties such as IR 64 DRT-1, Sahbhagi, Abhishek, CR Dhan-320, and Swarna Samridhi Dhan in rice; Birsa Arhar-1 in pigeon pea; Pant Urd-31 in black gram; PM-30 in mustard; Swarna Sampada and Swarna Lalima in tomato; Swarna Praphulya in chilli; Swarna Shyamali in brinjal; Swarna Sneha in bottle gourd; Swarna Mukut in cowpea; Arka Niketan in onion; and Shree Bhadra in sweet potato. Balanced use of manures and fertilizers, use of plant growth regulators, integrated pest and disease management and timely irrigation were practiced. Scientific management of livestock and cultivation of sugarcane on 0.5 acre further strengthened farm diversification. Sale of produce through village-level and weekly markets for quick disposal and better price realization.

Results / Output

Adoption of scientific crop production practices resulted in higher yields, improved quality of produce, reduced pest and disease incidence, and efficient utilization of inputs. Year-round income generation through diversification with vegetables and livestock. The integrated farming system enhanced overall farm resilience and income stability.

Impact of Technology / Intervention

KVK interventions significantly enhanced farm profitability by reducing cost of cultivation and increasing productivity. The net annual income increased to Rs. 3.68 lakhs, leading to improved livelihood security and better socio-economic status of the farm family.

Table 3.5 : Enterprise-wise Economic Details

Crop / Enterprise	Area / Nos.	Net Income (Rs.) – Before	Net Income (Rs.) – After	Increase (Rs.)
Rice	1.00 acre	20,000	31,000	11,000
Millets (Finger Millet)	0.50 acre	12,000	20,000	8,000
Pulses (Urd & Arhar)	0.40 acre	10,000	16,000	6,000
Oilseeds (Groundnut & Niger)	0.40 acre	6,500	9,000	2,500
Vegetables	1.20 acre	1,35,000	2,30,000	95,000
Goatery	17 Nos.	25,000	45,000	20,000
Cattle	6 Nos.	4,500	7,500	3,000
Other Enterprises	–	7,000	9,000	2,000
Total Net Income (Rs.)	–	2,10,000	3,67,500	1,57,500

Lessons Learned and Future Plans

Mr. Ganjhu's success demonstrates that adoption of scientific packages of practices, improved varieties, and integrated farming systems can substantially enhance farm income. He plans to expand vegetable cultivation, strengthen livestock enterprises, adopt value addition, and motivate fellow farmers to adopt scientific and sustainable farming practices for long-term income security. His journey highlights the importance of science-led, diversified agriculture for long-term income security and rural livelihood enhancement.



Fig 3.5 Climate resilient rice variety CR Dhan 320 and Niger Cv. JNS 28 in Sri Santosh's fields at Mandu, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

3.6 ENHANCING FARM INCOME THROUGH INTEGRATED FARMING SYSTEM (IFS): A SUCCESS STORY OF MR. ANIL KUMAR SINHA FROM NALANDA, BIHAR

Profile of the farmer

Name: Mr. Anil Kumar Sinha, Age :55 years, Address: Rajan Vigaha, Pratappur, Nalanda -803120, Mobile: 7549910384, Education : BA, Farming experiences: More than 12 years



Situation Analysis / Problem Statement

Mr. Anil Kumar Sinha was earlier engaged in conventional crop-based farming with limited diversification. The farming system was primarily dependent on seasonal cereal crops, resulting in low and unstable income, high vulnerability to climatic variability, and inefficient utilization of farm resources. Rising input costs, fluctuating market prices, and lack of integration among farm enterprises further reduced profitability. There was an urgent need to adopt a scientifically planned Integrated Farming System (IFS) to enhance income, ensure livelihood security, and improve sustainability.

Plan, Implementation and Support / Interventions

Based on field assessment and farmer consultation, a comprehensive Integrated Farming System (IFS) model was planned and implemented under technical guidance and continuous advisory support from ICAR–Research Complex for Eastern Region (ICAR-RCER), Patna. The intervention aimed at enterprise diversification, recycling of farm resources, and optimization of land and water use. Capacity-building support, exposure visits, and technical backstopping were provided to ensure successful adoption.

Details of Practices Followed by the Farmer

- Adoption of Integrated Farming System (crop+fish+horticulture+ allied enterprises)
- Establishment of mushroom cultivation units using scientific methods
- Setting up of a mushroom spawn production unit for assured quality seed
- Introduction of beekeeping to enhance pollination and generate additional income
- Development of fish farming in farm pond for income and nutritional security
- Cultivation of horticultural crops (vegetables and fruits) for regular cash flow
- Cultivation of cereal crops for food security and straw for mushroom substrate
- Recycling of crop residues and farm wastes within the system
- Adoption of improved agronomic and farm management practices

Results / Output

- Successful diversification of farm enterprises
- Increased cropping intensity and efficient use of farm resources
- Round-the-year income and employment generation

- Enhanced household nutritional security
- Improved resilience against climate and market-related risks
- Establishment of the farmer as a progressive and model IFS practitioner in the locality

Economic Impact of Technology / Intervention

The adoption of the Integrated Farming System under ICAR-RCER guidance resulted in a substantial increase in farm income. The total annual net income increased from Rs. 2.5 lakhs to approximately Rs. 7.30 lakh from an area of 2.0 ha, ensuring financial stability and improved living standards. The IFS model also reduced production risk and input dependency through internal resource recycling.

Table 3.6 : Enterprise-wise Economic Details

Crop / Livestock / Fish / Enterprise	Area (acre) / No.	Cost of Production (Rs./unit)	Return (Rs./unit)	Net Income (Rs./unit)
Mushroom cultivation	Shed-based (unit)	2,20,000	4,80,000	2,60,000
Mushroom spawn production	1 lab unit	1,00,000	2,50,000	1,50,000
Beekeeping	50 boxes	40,000	90,000	50,000
Fish farming	0.5 acre pond	60,000	1,20,000	60,000
Horticulture crops	2.0 acre	80,000	1,50,000	70,000
Cereal crops	2.0 acre	70,000	1,40,000	70,000
Total Net Income (IFS Model)	—	—	—	Rs. 7,30,000

Lessons Learned and Future Plans

Lessons Learned

- Integrated farming enhances income stability and sustainability
- Scientific planning and institutional support are essential for success
- Recycling of farm resources reduces cost of cultivation

Future Plans

- Expansion of mushroom and allied enterprises
- Adoption of value addition and better market linkage
- Acting as a resource farmer to motivate neighbouring farmers under IFS programmes



Fig 3.6 Various Component of IFS adopted by Sri Anil Kumar, Pratapur, Nalanda

(Contribution: Sanjeev Kumar and IFS Team, ICAR-RCER, Patna)

3.7 FROM TRADITIONAL FARMING TO INTEGRATED FARMING : THE SUCCESS OF MR. JAINARAYAN KAJI

Profile of the farmer

Name: Mr. Jainarayan Kaji, Age : 43 years, Address: Binwaliya, Block: Bagha, District: West Champaran, Moblie no.: 9931811212, Education: Intermediate, farming experiences :More than 20 years

Situation Analysis / Problem Statement

Mr. Jainarayan Kaji was practicing traditional and unorganized farming on his 3-acre land holding. His cropping system primarily consisted of rice–wheat rotation, black gram, and sugarcane. Due to reliance on conventional practices, limited mechanization, and inadequate technical knowledge, crop productivity remained low and farm returns were unsatisfactory. The absence of enterprise diversification further restricted income stability and resource optimization.

Plan, Implement and Support / Interventions

Under the guidance of ICAR-RCER, Patna through KVK, Madhopur (Tribal Sub-Plan – TSP), the farmer adopted scientific and integrated approaches to farming. Key interventions included:

- Technical training and continuous advisory support
- Adoption of an Integrated Farming System (IFS) model (crop+fish+mushroom)
- Introduction of mushroom cultivation (commercial scale)
- Establishment of a mushroom spawn production unit
- Adoption of Sugarcane Single Bud Planting System
- Zero tillage using Happy Seeder/Seed Drill



- Direct Seeded Rice (DSR) using inclined plate planter
- Establishment of a pond-based fish farming unit
- Efficient irrigation management practices

Details of Practices Followed by the Farmer

- Integration of crop, mushroom, and fish enterprises for efficient recycling of farm resources
- Mechanization ensuring timely operations and reduced labour costs
- Commercial-scale mushroom production and spawn multiplication
- Scientific fish farming in a 0.5-acre pond
- Efficient water management and improved input-use efficiency
- Provision of farm machinery services to the local farming community

Results/Output

- Significant improvement in crop productivity and enterprise diversification
- Enhanced overall farm income from 1.5 lakh to 4.35 lakh
- Successful operation of Custom Hiring Center benefiting nearby farmers
- Recognition as a progressive farmer in the locality
- Increased adoption of ICAR-RCER-supported technologies by other farmers

Economic Impact of Technology/Intervention

- Total annual income from all enterprises: Rs. 4.35 lakh
- Enhanced profitability due to mechanization and integrated farming
- Improved adoption of modern technologies in the village

Table 3.7 : Enterprise-wise Economic Details

Crop / Livestock / Fish / Enterprise	Area (acre) / No.	Cost of Production (Rs. /unit)	Return (Rs. /unit)	Net Income (Rs. /acre)
Mushroom cultivation	Shed-based (unit)	80,000	2,00,000	1,20,000
Mushroom spawn production	1 lab unit	80,000	1,30,000	50,000
Fish farming	0.5 acre pond	75,000	3,00,000	2,25,000
Cereal crops	2.0 acre	65,000	1,05,000	40,000
Total Net Income (IFS Model)	—	—	—	Rs. 4,35,000

Lessons Learned and Future Plans

- Modern technologies, mechanization, and integration of enterprises significantly improve farm income
- Plans to expand custom hiring services and more crop diversification.
- Continuous engagement with ICAR-RCER, Patna for training and technical support



Fig 3.7 Integration of fish livestock, vegetables, mushroom and cereals under IFS by Sri Jainarayan Kaji of village Binwaliya, West Champaran

(Contribution: Sanjeev Kumar and IFS Team, ICAR-RCER, Patna)

3.8 TURNING SMALL LAND HOLDINGS INTO WEALTH: A STORY OF SCIENTIFIC FARMING EXCELLENCE

Profile of the farmer

Name- Bajinath Mahato, Age: 55 years, Address: Matatu, Block: Ormanjhi, Distt.: Ranchi. Education: B.Com, Farming Experience: 34 years, Mobile number: 9934108478; Recipient of Innovative farmer award from ICAR -IARI, New Delhi and ICAR RCER, Patna

Situation Analysis / Problem Statement

The family of Mr. Bajinath Mahato originally owned about 30 acres of land, which was submerged during the construction of the Getalsud Dam. With the



compensation received, the family purchased only 3.5 acres of land in Matatu village. After the demise of his father, Late Shri Khileshwar Mahato, in 1992, Baijnath Mahato assumed responsibility for the family and chose farming as his primary livelihood. Faced with limited land resources and the need for stable income, he envisioned transforming agriculture into a reliable and regular source of income comparable to salaried employment.

Planning, Implementation and Support / Interventions

With the objective of ensuring a stable monthly income from farming similar to salaried employment, a systematic cropping plan was adopted. The agricultural land was divided into different plots, and crops of four-month duration were cultivated in a staggered manner (January–April, February–May, March–June, April–July, etc.), thereby creating a twelve-month production cycle. Mr Baijnath Mahato visited **ICAR-RCER FSRCHPR, Plandu, Ranchi** where he gained practical knowledge through training and capacity building activities on :

- Raised bed planting techniques
- Mulching technology
- Drip irrigation systems
- Vegetable-based IFS technology

This institutional guidance played a pivotal role in scaling up his farming enterprise and expansion of cropping area to 50 acres (35 Acres own land and 15 acres of leased-in land)

Practice followed by farmer

A. Integrated Farming System (IFS)

- Adopted a vegetable-based Integrated Farming System (IFS) to ensure diversified production and year-round income.
- Integration of livestock farming ensuring the availability of organic inputs.

B. Crop Planning and Diversification

- Systematic crop rotation is followed to maintain soil health and productivity.
- A diverse range of crops is cultivated in every season to ensure crop diversity and sustainable production.
- Summer and off-season vegetable cultivation includes high-value vegetable crops like tomato, chilli etc. for better income realization.

C. Improved Cultivation Practices

- Adoption of raised bed method for improved drainage and root development.
- Use of drip irrigation for efficient water management.
- Practice of mulching to conserve soil moisture and suppress weeds.
- Trellis cultivation for climbing vegetable crops like cucurbits to improve yield and quality.
- Use of yellow sticky traps and pheromone traps for eco-friendly pest management.
- Cultivation of bacterial wilt-resistant varieties of solanaceous vegetables to minimize disease incidence.

D. Marketing and Value Chain Management

- Adoption of efficient marketing channels to ensure better price realization.
- Transportation of nearly 50 per cent of produce to neighbouring states like Odisha, Chhattisgarh and Bihar for expanding market reach and profitability.

Results/Output

Through his Integrated Farming System (IFS) model across 50 acres of land, he earns a net annual income of Rs. 1.15 crores. The model has also contributed to local employment generation in and around his residence and serves as a demonstration unit through which he actively guides and mentors fellow farmers in adopting sustainable and diversified farming practices.

Table 3.8 : Enterprise-wise economic details

Sl. No.	Component	Gross income (Rs. In Lakh)	Net income (Rs. In Lakh)	Expenditure (Rs. In Lakh)	Benefit-cost ratio (BC ratio)
1	Field crops (5 acres)	2.50	1.00	1.50	1.67
2	Kharif Vegetables (45 acres)	67.50	45.00	22.50	3.00
3	Rabi Vegetables (45 acres)	38.25	22.50	15.75	2.43
4	Summer Vegetables (45 acres)	81.00	45.00	36.00	2.25
5	Dairy (6 cows)	1.30	1.00	0.30	4.33
6	Goatry (12 goats)	0.60	0.50	0.10	6.00
Total		191.15	115.00	76.15	2.51

Impact of Technology/Intervention

His initiative has contributed significantly to local economic development by generating employment opportunities for many farmers. In addition to direct employment, the guidance and training imparted to fellow farmers have enabled them to adopt improved and sustainable farming practices, leading to increased productivity and higher farm incomes.

Lessons Learned and Future Plans

Proper planning, diversification, and adoption of improved practices in farming can provide stable and profitable year-round income. Integrating crops and livestock with natural inputs, efficient resource management, and accessing wider markets can reduce risk and enhance sustainability, making agriculture a reliable livelihood.

Bajnath Mahato aspires to connect more farmers by encouraging them to adopt similar farming practices for enhancing their income. He aims to mobilize farmers through the group approach and work towards building a strong and empowered Farmer Producer Organization.

Recognitions

Around 1000-1200 farmers from Jharkhand, Bihar, Orissa and Chhattisgarh visit his farm every year. He delivers 50-60 lectures every year as resource person in the trainings conducted by ICAR-RCER, FSRCHPR, Plandu, Ranchi, State Govt, NGOs and Mobile Agriculture School. He is also working as member of Advisory Committee in Doordarshan, Ranchi.



Fig 3.8.1 Field visit in muskmelon field



Fig 3.8.2 Bitter gourd farming with poly Mulching

(Contribution: V. K. Yadav, Amrita Soni, Kundan Kumar Singh, Debabrata Mahato, Awani Kumar Singh and Anup Das, ICAR-RCER, FSRCHP, Ranchi)

3.9 FROM STRUGGLE TO STRENGTH: A FARMER'S JOURNEY TOWARDS PROSPERITY IN NAWADA

Profile of the farmer

Name: Mr. Shankar Vishwakarma, Age: 50 years, Address: Janhaul, Sirdala, District: Nawada, Mob.7808030900, Education: Intermediate, Farming experience : 25 years

Situation Analysis / Problem Statement

Earlier, Mr. Shankar Vishwakarma was dependent mainly on a flour mill (atta chakki) for his livelihood. He owned about 3.0 acres of low-fertility agricultural land, where crop productivity was extremely poor due to poor soil health, inadequate irrigation management, and traditional farming practices. Low productivity, high agricultural risk, and limited income adversely affected his socio-economic development and livelihood security.

Planning, Implementation, and Support / Interventions

Under the technical guidance of scientists of ICAR-Research Complex for Eastern Region, Patna and KVK, Nawada; Mr. Vishwakarma initiated agricultural development activities as a part of DST-SEED funded project on “Sustainable Improvement In Livelihood of Scheduled Caste Community By Development of Science Technology and Innovation Hub In Meskaur And Sirdala Blocks of Nawada District, Bihar”, which was implemented at Janhaul alongwith three other villages. Mr Vishwakarma was supported by demonstration of high yielding crop varieties,



introduction of superior goat breed for livestock support and capacity building through training, field day and exposure visits.

Major Technologies Interventions

- Soil testing and improvement of soil fertility through organic manure and balanced fertilizer application
- On Farm Demonstration of improved crop varieties and adoption of scientific crop management practices
- Crop diversification involving paddy, wheat, chickpea, groundnut, mustard and french bean
- Introduction of goat farming as an allied enterprise
- Regular technical guidance, exposure visits, and consultations by ICAR-RCER and KVK scientists

Technologies and Farming Practices adopted by the Farmer

- Balanced fertilizer application based on soil test recommendations
- High-yielding crop varieties for major crops like Paddy (Rajendra Sweta and Swarna Samridhi), Wheat (DBW 187 and HD 2967), Mustard (Pant Sweta) and Chickpea (Swarna Laxmi)
- Goat rearing using Black Bengal goats
- Efficient irrigation management and timely execution of all agricultural operations

Enterprise-wise Economic Details

The adoption of high yielding varieties of different crops and management practices coupled with diversification and introduction of goat rearing have increased the income level of Mr. Vishwakarma by almost 2.5 times as compared to earlier situation.

- **Before intervention:** Net annual income – Rs. 94,300/-
- **After intervention:** Net annual income – Rs. 2,38,857

Impact and Achievements

- Significant improvement in annual income and livelihood security and reduced dependence on non-farm income
- Enhanced adoption of high yielding varieties and scientific agricultural technologies
- Introduction of livestock enterprise like goat rearing
- Awarded by institute for progressive work and involvement in motivating and guiding of neighbor farmers to adopt scientific farming practices

Key Learnings and Way Forward

This success story demonstrates that continuous technical support and adoption of innovative agricultural technologies under the guidance of ICAR-RCER, Patna can effectively enhance farmers' income and promote sustainable rural development.

Future Outlook

- Expansion of crop-based and allied agricultural enterprises
- Adoption of advanced and innovative scientific farming technologies
- Wider dissemination of agricultural technologies through Farmer-to-Farmer Extension

Table 3.9 : Enterprise-wise Economic Details

Before intervention				After intervention			
Enterprises / Crops	Area (Acre)	Production (qt.)	Net Income (Rs.)	Enterprises / Crops	Area	Production (qt.)	Net Income (Rs.)
Paddy (Mugadha)	2	32.4	56,500	Paddy R. Sweta & Swarna Samridhi	2.0 acre	43.2	83,952
Wheat (Local)	2	21.6	37,800	Wheat (DBW- 187 & HD- 2967)	2.0 acre	32.4	64,570
				Groundnut	446 m ²	0.87	6,319
				Chickpea	891 m ²	1.62	9,153
				Moong	1.0 acre	5.4	37,300
				Vegatables (Tomato, Chilli, Brinjal)	446 m ²	7.0	18,500
				Mustard	891 m ²	1.92	9,924
				Goat			15,000
Total			94,300	2,44,718			

**Fig 3.9.1** Award by ICAR-RCER, Patna**Fig 3.9.2** Field day program on Mustard Crop at Shankar Vishwakarma's field**Fig 3.9.3** Measurement of weight of goat**Fig 3.9.4** Field demonstration program on Rice field

(Contribution: Dhiraj Kumar Singh, Ujjwal Kumar, P C Chandran, Anirban Mukherjee, R K Raman and Rakesh Kumar, ICAR-RCER, Patna)

3.10 FROM CONVENTIONAL CROPPING TO DIVERSIFIED ENTERPRISE: A SMALL FARMER'S SUCCESS STORY

Profile of the Farmer

Name: Mr. Mukesh Kumar Singh, Age: 38 years, Address: Bhitihara, Post: Atarauna, Block: Itarhi, District: Buxar, Bihar, Education: Graduate, Farming Experience: 10 Year

Background and Situation Analysis

Mr. Mukesh Kumar Singh, a small farmer from Bhitihara village, was traditionally cultivating rice–wheat on his 7 acre farm. Despite continuous efforts, he faced multiple challenges such as low farm income, high production risks, inefficient resource utilization, seasonal unemployment, climate variability, fluctuating market prices, and rising input costs. These constraints limited the profitability and sustainability of his farming enterprise. Recognizing the need for diversification and climate-resilient practices, he sought technical guidance from KVK, Buxar to transform his farm into a more productive and stable system.



Institutional Support and Interventions

Krishi Vigyan Kendra, Buxar provided him training on the Integrated Farming System (IFS) under the technology demonstration component of National Innovations on Climate Resilient Agriculture (NICRA). Regular field visits, monitoring, and scientific advisory services enabled him to adopt a holistic farm planning approach aimed at enhancing productivity, profitability, employment generation, and year-round income.

The IFS model integrated multiple complementary enterprises, including:

- Crop production (Rice–Wheat–Moongbean)
- Goatary (Black Bengal)
- Farm pond
- Fish farming

The planning process emphasized land capability, efficient water resource utilization through pond integration, scientific crop selection, diversification, improved agronomic and livestock management, and effective nutrient and disease management.

Interventions and Technologies Adopted

Mr. Singh adopted a diversified IFS model integrating the following components:

I. Crop Production System (5 Acres)

Kharif Season:

- Crops: Paddy (Swarna Samridhi, Swarna Sub-1), fodder crops, sorghum, turmeric, trap crops
- Practices: Line transplanting, balanced fertilization, Integrated Pest Management (IPM)

Rabi Season:

- Crops: Wheat, mustard, chickpea, vegetable pea

- Practices: Timely sowing, seed treatment, crop rotation, irrigation using pond water

Summer Season

- Crop: Moong (short-duration varieties)
- Practice: Utilization of residual soil moisture with minimal irrigation

II. Pond-Based Farming (2 Acres)

- Composite fish culture: Rohu, Katla, Grass Carp, Mrigal
- Regular liming and organic fertilization using goat manure
- Pond water used for supplemental irrigation during dry spells

III. Goatary Unit

- Herd Size: 60 improved Black Bengal goats
- Housing: Raised, well-ventilated sheds
- Feeding: Stall feeding using crop residues, fodder, and concentrates
- Health Management: Regular vaccination and deworming

IV. Resource Recycling

- Utilization of goat manure for compost preparation
- Nutrient recycling between crop, livestock, and fish components
- Efficient water utilization through pond integration

Economic benefits of technological interventions

The adoption of the Integrated Farming System significantly enhanced farm income and reduced production costs.

- Annual Income Before Intervention: Rs. 1,44,296
- Net Annual Return After Intervention: Rs. 9,12,600
- Reduction in Cost of Cultivation (Crop Component): 34.5%
- Total Employment Generated: 348 mandays annually

The major increase in income was attributed to diversification, value addition, and efficient recycling of farm resources.

Significant increase in total farm income from Rs 159,033 to Rs 1,052,300/ per annum compared to conventional farming systems was observed. Significant reduction of 34.5 % was also observed in cost of cultivation per acre in crops component of IFS model mainly due to application of organic manure and reduced fertilizer dose.

Outcomes and achievements

- ✓ Transitioned from a single cropping system to a diversified and climate-resilient farming model resulting in almost **nine times** increase in income.
- ✓ Created substantial on-farm employment to the extent of 348 mandays.
- ✓ Optimized resource utilization through integration of crops, livestock, and fisheries.
- ✓ Emerged as a model farmer demonstrating the benefits of Integrated Farming Systems

Table 3.10.1 : Crop production and economics before intervention per acre (2021-2022)

Crops	Yield (kg/ acre)	Cost of cultivation (Rs/acre)	Gross Income (Rs/acre)	Net income (Rs/acre)	Mandays (No.)
Paddy	2022	16100	36396	20296	65
Wheat	1520	18320	30400	12080	
Mustard	260	8000	40000	32000	
Chickpea	681	11000	37500	26500	
Total	-	53,420	1,44,296	90,876	

Table 3.10.2 : Economics of Agriculture after intervention of IFS

Sl. No.	Components	Area of component (acre)	Cost of cultivation (Rs.)	Gross Income (Rs.)	Net Return (Rs.)	Mondays
1	Crops	5.0	69,700	3,52,300	2,82,600	85
2	Fish Farming	2.0	45000	315000	270,000	48
3	Livestock Goat	60 goats	70000	325000	318000	185
4	By products (compost)	0.10	18000	60000	42000	30
	Total	07	2,02,700	10,52,300	9,12,600	348

Key Lessons and Way Forward

Through IFS approach, Mr. Singh gained practical expertise in integrating livestock and fisheries with crop production, recycling nutrients, and converting crop residues into compost. His determination to achieve higher farm income has made him an inspiring example for fellow farmers to move beyond conventional agriculture and adopt innovative, sustainable livelihood strategies. He plans to further strengthen integrated components, expand enterprises, and continue generating employment opportunities within his community.

The transformation of Mr. Mukesh Kumar Singh's farm clearly demonstrates that Integrated Farming Systems can significantly improve profitability, resilience, and sustainability for smallholders. With strong institutional support from KVK Buxar, his farm evolved into a diversified enterprise ensuring stable income and year-round employment—highlighting IFS as a pathway toward climate-smart and economically viable agriculture.



Fig 3.10 Mr. Mukesh at his goat farm

(Contribution: Deokaran, Ramkewal, Harigovind and Ravi Chaterjee, ICAR-RCER, KVK, Buxar)

3.11 WHEN KNOWLEDGE MEETS THE SOIL: A GRADUATE'S JOURNEY TO FARMING SUCCESS

Profile of the farmer

Name : Mr. Ram Saran Dangi, Age: 35 years, Address: Nawadih, Post : Bariyatu, Block: Gola, District : Ramgarh, Mobile No.: 9931153621, Education: Graduation, Farming experiences: 20 years. A recipient of Progressive Farmer Award from BAU, Ranchi and ICAR-RCER, Patna

Situation Analysis/Problem Statement

After completing graduation, Mr. Ram Saran Dangi aspired to enter in government service but was unable to succeed despite repeated attempts. Facing uncertainty regarding career prospects and livelihood security, he decided to adopt farming as a profession. In the initial phase, he lacked practical exposure to scientific agricultural practices, enterprise diversification, and integrated farming approaches, which posed significant challenges in achieving stable and sustainable income from farming.



Plan, Implementation and Support/Interventions

Mr. Dangi underwent regular training programmes at Krishi Vigyan Kendra (KVK), Ramgarh on off-season vegetable production, fishery, and goatry. With continuous technical guidance and motivation from KVK scientists, he adopted the Integrated Farming System (IFS) model, integrating crop production with allied enterprises for assured and sustainable income.

Details of Practices Followed by the Farmer

- Adoption of Integrated Farming System (IFS) model
- Scientific vegetable cultivation with crop diversification
- Off-season vegetable production for higher market returns
- Fish farming with proper pond management
- Goat rearing using improved management practices
- Regular interaction with KVK for advisory services

Results/Output

Through adoption of scientific farming practices and the IFS model, Mr. Dangi achieved stable and enhanced farm income. His annual income exceeded Rs. 5.00 lakh, leading to significant improvement in household welfare. The increased income enabled him to purchase a car and ensure quality education for his children, reflecting improved livelihood security and social well-being.

Impact of Technology/Intervention

The Integrated Farming System effectively minimized production and market risks, enhanced resource-use efficiency, and ensured round-the-year income generation. Adoption of scientific technologies not only improved the economic condition of the farmer but also led to a positive change in his social status and confidence in farming as a viable profession.

Enterprise-wise Economic Details

The adoption of the Integrated Farming System enabled diversification of income sources and ensured year-round livelihood security.

Sl. No.	Enterprise	Net Income Before Intervention (Rs/year)	Net Income After Intervention (Rs/year)	Key Improvements/Remarks
1	Vegetable Cultivation (including off-season vegetables)	2,00,000	4,00,000	Improved varieties, off-season production, IPM and scientific crop management ensured higher returns
2	Fishery	—	60,000	Scientific pond management provided additional income and reduced risk

3	Goatry	—	45,000	Improved breeds, scientific housing, balanced feeding and healthcare increased productivity
Total	—	2,00,000	5,05,000	Integrated Farming System ensured year-round, diversified and sustainable income

Key Learnings and Future Plans

This success story demonstrates that scientific farming practices integrated with allied enterprises can provide a dignified, stable, and profitable livelihood, even for educated rural youth.

Future Plans

- Expansion of off-season vegetable cultivation to further enhance farm income
- Adoption of value addition and improved marketing strategies for better price realization
- Motivating and guiding educated rural youth to adopt agriculture as a sustainable and rewarding profession through experience sharing and farmer-to-farmer learning



Fig 3.11 Performance of various crops in Mr Ramsaran Dangi 's fields in the village Nawadih, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)



4.1 ROUND-THE-YEAR VEGETABLE PRODUCTION FOR HIGHER INCOME

Profile of the farmer

Name: Mr. Sandeep Kumar, Age: 35 years, Address :- Kamat, Post :- Bariyatu Block :- Gola, District :- Ramgarh, Mobile No.: 6299664835, Education: Intermediate, Farming experiences: 20 years, Received district level Best Farmer Award



Situation Analysis / Problem Statement

Mr. Sandeep Kumar, a farmer cultivating 4 acres in Ramgarh district, was practicing traditional farming without proper crop planning, scientific management, or use of improved agricultural technologies. Low productivity, high cost of cultivation, and seasonal income constrained the profitability of his farm, limiting opportunities for sustainable livelihood and economic growth.

Plan, Implementation and Support / Interventions

To enhance productivity and income, Mr. Sandeep Kumar actively participated in training programmes, demonstrations, and advisory services organized by Krishi Vigyan Kendra (KVK), Ramgarh. Based on KVK guidance, he transitioned from traditional practices to scientific vegetable cultivation, adopting improved crop varieties and implementing proper crop scheduling for year-round production. Continuous technical support, field-level guidance, and monitoring by KVK scientists ensured effective adoption of recommended practices.

Details of Practices Followed by the Farmer

- Scientific cultivation of cabbage, cauliflower, tomato, sweet corn, brinjal, and potato
- Off-season vegetable cultivation for higher market price
- Raising healthy seedlings in nursery and timely transplanting
- Integrated Pest and Disease Management practices

Results / Output

Through the adoption of scientific vegetable cultivation and improved crop management practices, Mr. Sandeep Kumar achieved year-round vegetable production. His annual net income from vegetable cultivation alone exceeded Rs. 5.00 lakh, reflecting a significant improvement in farm profitability and livelihood security.

Impact of Technology / Intervention

The intervention resulted in a marked improvement in farm productivity, reduction in crop losses, and better price realization. Adoption of scientific vegetable cultivation practices enabled efficient input utilization, improved quality of produce, and stable year-round income generation. As a result, the socio-economic condition of Mr. Sandeep Kumar and his family improved significantly, strengthening livelihood security and confidence in farming as a profitable enterprise. The diversified vegetable-based farming system resulted in a net income increase of Rs. 6.35 lakh.

Table 4.1 : Enterprise-wise Economic Details

Enterprise	Gross Income Before Intervention (Rs.)	Gross Income After Intervention (Rs.)	Increase in Income (Rs.)
Carrot	80,000	3,00,000	2,20,000
Tomato	20,000	50,000	30,000
Sweet Corn	50,000	2,00,000	1,50,000
Brinjal	30,000	1,00,000	70,000
Potato	70,000	2,00,000	1,30,000
Palak	15,000	50,000	35,000
Total	2,65,000	9,00,000	6,35,000

Lessons Learned and Future Plans

This success story demonstrates that regular capacity building, adoption of scientific cultivation practices, and crop diversification can substantially enhance farm income and sustainability. Encouraged by the results, Mr. Sandeep Kumar plans to expand off-season vegetable cultivation, adopt protected cultivation technologies, and actively motivate fellow farmers to adopt scientific vegetable production for sustainable and year-round income generation.



Fig 4.1 Carrot, cabbage and sweetcorn cultivation for higher returns

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

4.2 ENHANCING FARM INCOME THROUGH VEGETABLE–GOAT INTEGRATION

Profile of the farmer

Name: Mr. Raju Verma, Age: 29 years, Address : Bargaon, Block : Mandu, District: Ramgarh ,Jharkhand, Mobile No.: 9905560339, Education: Intermediate, Farming experience: 11 years

Situation Analysis / Problem Statement

Mr. Raju Verma was earlier engaged in farming using traditional agricultural practices, which resulted in low productivity and limited income. Vegetable cultivation was carried out without scientific crop planning, balanced nutrient management, or appropriate plant protection measures.

Similarly, goat rearing was practiced in a conventional manner, characterized by poor breed selection, inadequate housing, and lack of scientific feeding and healthcare management. Due to these constraints, crop yields remained low, mortality in goats was relatively high, and overall farm income was insufficient to ensure economic sustainability.

Plan, Implement and Support / Interventions

To address these challenges, Mr. Verma approached Krishi Vigyan Kendra, Ramgarh, where he received skill-oriented training on improved vegetable production technologies and scientific goatry management practices.

KVK scientists provided need-based technical guidance, exposure to improved production methods, and regular advisory support on input use, pest and disease management, and enterprise planning. Periodic follow-up visits ensured proper adoption and effective implementation of the recommended technologies.

Details of Practices Followed by the Farmer

- Adoption of scientific vegetable cultivation practices, including use of improved varieties, proper spacing, timely sowing, and quality seed material
- Adoption of integrated pest and disease management practices to minimize crop losses
- Introduction of scientific goatry practices, including improved breed selection (Black Bengal), proper housing, balanced feeding, vaccination, and regular deworming
- Establishment of linkages with local markets for better price realization of vegetables and goats

Results / Output

After adopting improved technologies and scientific management practices, Mr. Verma recorded a significant increase in vegetable yields and improved goat survival rates. Production efficiency improved, crop losses were reduced, and marketable surplus increased substantially.

The integration of vegetable cultivation with goat rearing ensured regular and diversified income throughout the year, thereby improving livelihood security and economic sustainability.

Economic Impact of Technology/Intervention

The adoption of scientific vegetable cultivation and improved goatry management practices led to a substantial increase in farm income. Mr. Raju Verma is now earning more than Rs. 4.00 lakh per annum, which has significantly improved his family livelihood, financial stability, and resilience. The enhanced profitability has also strengthened his confidence in farming as a viable and sustainable enterprise.

Enterprise-wise Economic Details

The integration of scientific vegetable cultivation with improved goatry practices resulted in enhanced income, risk diversification, and year-round livelihood security.

Lessons Learned and Future Plans

- Scientific knowledge, skill-based training, and continuous technical guidance play a crucial role in enhancing farm income and productivity.
- Integration of crop and livestock enterprises effectively reduces production and market risks while ensuring year-round income and livelihood stability.

Future Plans

- Expansion of vegetable cultivation area to further improve farm profitability and market-oriented production.
- Increase in goat units through adoption of improved breeds and scientific management practices.
- Adoption of right marketing strategies to enhance price realization and overall farm income.

Table 4.2 : Enterprise-wise Income Details

Sl. No.	Enterprise	Gross Income Before Intervention (Rs/year)	Net Income Before Intervention (Rs/year)	Gross Income After Intervention (Rs/year)	Net Income After Intervention (Rs/year)	Key Improvements / Remarks
1	Vegetable Cultivation (Cauliflower, carrot, coriander, tomato, brinjal, potato etc.)	1,50,000	80,000	3,60,000	2,40,000	Improved varieties, scientific crop planning, balanced nutrient management, IPDM and better market linkage
2	Goatry	1,20,000	70,000	2,20,000	1,80,000	Improved breeds, scientific housing, balanced feeding, vaccination and regular deworming
Total	—	2,70,000	1,50,000	5,80,000	4,20,000	Crop–livestock integration ensured diversified, stable and year-round income



Fig 4.2 Performance of Vegetables in Sri Raju Verma's fields at Bargaon, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

4.3 TURNING TRADITION INTO TECHNOLOGY: A SUCCESSFUL SHIFT TO VEGETABLE-BASED FARMING

Profile of the farmer

Name: Mr. Umesh Mahto, Age: 39 years, Address :- Chandhi, Post :- Chandhi, Block :- Gola, District :- Ramgarh, Mobile No.: 8210676423, Education: Matriculation, Farming experience: 18 Years

Situation Analysis / Problem Statement

Mr. Umesh Mahto was earlier practicing mono-cropping under a traditional farming system. Owing to lack of crop diversification, inadequate knowledge of scientific nutrient management, and continued dependence on conventional practices, farm productivity remained low. Consequently, income from agriculture was insufficient to meet household requirements, making farming economically unsustainable.

Plan, Implementation and Support / Interventions

With regular interaction and technical guidance from Krishi Vigyan Kendra (KVK), Ramgarh, Mr. Mahto shifted towards intensive and diversified vegetable cultivation. Emphasis was laid on adoption of cash crops such as cauliflower, carrot, coriander, cucumber, and kharif onion, particularly promoting vegetable cultivation on upland areas. KVK scientists guided him on scientific crop planning, improved agronomic practices, and input management to enhance productivity and profitability.

Details of Practices Followed by the Farmer

- Scientific cultivation of cauliflower using improved varieties
- Potato cultivation on ridge and furrow method
- Onion cultivation during kharif season
- Crop diversification to reduce risk and ensure continuous income

Results / Output

Adoption of scientific vegetable cultivation practices resulted in significant improvement in yield and profitability. The farmer achieved a net annual income of more than Rs.4.00 lakh from vegetable cultivation, as detailed below:



Crop / Enterprise	Area (ha)	Approx. Net Income (Rs./Year)
Cauliflower	0.30	1,50,000
Carrot	0.20	90,000
Potato	0.20	80,000
Onion (Kharif)	0.15	60,000
Cucumber	0.10	40,000
Coriander	0.05	30,000
Total	1.0	4,50,000

Impact of Technology / Intervention

Scientific vegetable cultivation and proper nutrient management enhanced crop productivity, reduced cost per unit of production, and ensured better market returns. Crop diversification provided income stability and improved the overall economic condition of the farmer.

Vegetable cultivation (cauliflower, carrot, potato, onion, cucumber, coriander) emerged as the major source of income, contributing more than Rs. 4.00 lakh annually.

Table 4.3 : Enterprise-wise Economic Details

SI. No.	Enterprise / Crop	Area (ha)	Net Income Before Intervention (Rs./Yr)	Net Income After Intervention (Rs./Yr)	Major Technological Interventions Adopted	Impact / Outcome
1	Cauliflower	0.30	Negligible / Not practiced	1,50,000	Improved varieties, scientific crop planning, balanced nutrient management, timely irrigation	High productivity, higher market returns
2	Carrot	0.20	Not practiced	90,000	Proper spacing, balanced fertilization, diversification	Increased income and soil health
3	Potato	0.20	Low income under traditional method	80,000	Ridge & furrow method, improved agronomic practices	Better tuber yield and quality
4	Onion (Kharif)	0.15	Not practiced	60,000	Timely sowing, scientific nutrient & water management	Off-season income, better price realization
5	Cucumber	0.10	Not practiced	40,000	Off-season cultivation, scientific crop management	Quick returns, market advantage

6	Coriander	0.05	Not practiced	30,000	Improved varieties, integrated crop management	Additional income from short-duration crop
Total	Vegetable-based Farming System	1.00 ha	≈ Rs. 2.0–2.5 lakh /year (mono-cropping)	Rs. 4.5 lakh /year	Scientific vegetable cultivation & crop diversification	More than 60–100% increase in net income, year-round employment & income stability

Lessons Learned and Future Plans

This success story demonstrates that the adoption of scientific vegetable cultivation practices combined with crop diversification can substantially enhance farmers' income and livelihood security.

Future Plans

- Expansion of vegetable cultivation area to further increase farm income and productivity
- Adoption of improved varieties and precision nutrient management for higher efficiency and better resource use
- Motivating and guiding neighboring farmers to shift from mono-cropping to profitable vegetable-based farming systems through experience sharing and farmer-to-farmer extension.



Fig 4.3 Early Cauliflower cultivation by Sri Umesh Mahto, Chandi, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

4.4 CULTIVATING CONFIDENCE AND INCOME THROUGH SUSTAINABLE VEGETABLE FARMING

Profile of the farmer

Name: Basudeo Ganjhu, Age: 45 years, Address :- Govindpur, Block :- Mandu, District :- Ramgarh (Jharkhand), Mobile No.: 7870565723, Education: 12th, Farming experience: 23 years

Situation Analysis / Problem Statement

Shri Basudeo Ganjhu faced multiple challenges during the initial years of his farming career. Limited access to capital, inadequate technical knowledge, low and fluctuating market prices, climatic uncertainties, and frequent crop failures severely affected farm productivity and income. Dependence on traditional farming practices resulted in low yields and poor profitability, leading to economic stress and social discouragement. Despite these adversities, Shri Ganjhu remained determined to improve his farming system and livelihood.

Plan, Implementation and Support / Interventions

A major turning point came in 2018, when Shri Ganjhu established contact with Krishi Vigyan Kendra, Mandu, Ramgarh. Through regular interactions with scientists, need-based capacity-building programmes, exposure visits, and continuous field-level advisories, he was introduced to scientific and market-oriented farming practices. Key interventions included scientific vegetable cultivation, drip irrigation, off-season vegetable production and diversified farming systems. The KVK scientists provided close monitoring and handholding support, ensuring timely and effective adoption of recommended technologies at the field level.

Details of Practices Followed by the Farmer

Under expert guidance, Shri Ganjhu installed a drip irrigation system on 1.0 acre and adopted round-the-year vegetable cultivation, with major emphasis on cucurbitaceous crops such as cucumber, bitter melon, and watermelon. Balanced nutrient management was practiced using vermicompost and bio-fertilizers, contributing to improved soil health and sustainability.

He successfully adopted off-season vegetable cultivation to fetch premium market prices and diversified his cropping system with onion, garlic, chilli, capsicum, beetroot, carrot, broccoli, cabbage, cauliflower, coriander, tomato, banana, brinjal, red spinach, pulses, oilseeds, and vegetables on rice-fallow lands. Emphasis was placed on natural and eco-friendly farming practices, promoting environmental conservation and long-term sustainability.

Results / Output

The adoption of scientific and sustainable farming practices resulted in two to three times higher vegetable productivity, improved produce quality, reduced input costs, and efficient utilization of natural resources. Continuous and year-round supply of vegetables strengthened his market linkages and ensured better price realization. His farm gradually emerged as a model for diversified and sustainable vegetable farming in the area.

Impact of Technology / Intervention

KVK and ICAR RCER, FSRCHPR interventions significantly enhanced farm income and stability. Through adoption of modern technologies and diversified farming, Shri Basudeo Ganjhu achieved a net annual income of Rs. 4.12 lakhs, transforming his socio-economic status and overall quality of life.

Table 4.4 : Enterprise-wise Economic Details

Crop / Enterprise	Area / Nos.	Net Annual Income (Rs.) – Before	Net Annual Income (Rs.) – After	Increase (Rs.)
Cereals	1.50 acre	26,000	40,000	14,000
Pulses	0.25 acre	6,000	9,600	3,600
Oilseeds	0.25 acre	4,000	6,500	2,500
Vegetables	1.50 acre	1,45,000	3,06,000	1,61,000
Goatary	7 Nos.	18,000	34,000	16,000
Cattle	2 Nos.	2,000	3,800	1,800
Other Enterprises	–	6,000	12,000	6,000
Total	–	1,95,000	4,11,900	2,16,900

Lessons Learned and Future Plans

Shri Ganjhu's journey clearly demonstrated that perseverance combined with scientific guidance and modern technologies can overcome even severe agricultural challenges. He now plans to expand off-season and high-value vegetable cultivation, further strengthen natural farming practices, and actively motivate fellow farmers to adopt sustainable, climate-resilient, and income-oriented farming systems. His success continues to inspire farmers across Ramgarh district, reinforcing faith in science-led agriculture for sustainable rural livelihoods.



Fig 4.4 Vegetable cultivation on drip irrigation and poly mulching at Govindpur, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

4.5 VEGETABLE PRODUCTION BECAME A SOCIO-ECONOMIC GAME CHANGER: A SUCCESS STORY FROM BUXAR

Profile of the Farmer

Name: Mr. Jitendra Kumar Singh, Age: 38 years, Address: Dalsagar, District: Buxar, Bihar, Mobile: 9128077028, Education: Intermediate, Farming Experience: 15 Years

Background and Situation Analysis

Mr. Jitendra Kumar Singh is a medium farmer cultivating approximately 4 hectares of land (1.2 ha owned and 2.8 ha leased), where he grows cereals, pulses, and vegetables using traditional farming methods. He also maintained one milking buffalo and occasionally provides tractor services with a single cultivator implement. Despite managing a relatively larger operational area, his earnings remained modest due to limited awareness of improved production technologies and distress selling of farm produce at the farm gate. The absence of mechanization and scientific crop management further constrained productivity and profitability.

Institutional Support and Interventions

Seeking to enhance his farm income, Mr. Singh approached Krishi Vigyan Kendra, Buxar for training on best management practices. After completing the training under CRA programme, KVK specialists conducted regular field visits and provided continuous technical backstopping and motivation. To promote farm mechanization and efficient resource use, KVK supported him with multifunctional implements such as:

- Raised bed planter
- Zero-tillage machine

During implementation of CRA at Dalsagar, Buxar; he was encouraged to adopt improved practices including line sowing, raised bed planting, intercropping of coriander with maize, zero-tillage cultivation of wheat, chickpea, and mustard, line sowing of bajra, raised bed pigeon pea and tomato cultivation, crop residue management, and laser land levelling.

Improved Practices Adopted

With technical guidance from KVK, Mr. Singh transitioned toward scientific farming by implementing CRA practices like

- Raised bed planting of maize and pigeon pea using a multi-crop planter
- Zero-tillage sowing of wheat, lentil, chickpea, and mustard
- Line sowing in moong bean, pearl millet, and rice
- Intercropping systems integrating maize with coriander and commercial vegetables
- Cultivation of high-value vegetables such as brinjal, tomato, cauliflower, and vegetable pea



- Adoption of Integrated Nutrient Management (INM) and Integrated Pest Management (IPM)
- Efficient operation of farm machinery along with improved marketing strategies

Economic benefits of technology interventions

The adoption of advanced technologies significantly enhanced farm productivity and profitability. Scientific vegetable production, combined with mechanization and diversified cropping systems, transformed his farm into a sustainable and commercially viable enterprise.

- Net annual income (Before intervention): – Rs. 660, 200/-
- Net annual income (After intervention): – Rs. 1,707, 269

Major Achievements and impact

- ✓ Nearly threefold increase in annual income through scientific farming.
- ✓ Reduced dependence on traditional practices and distress sales.
- ✓ Strengthened livelihood security through diversified income sources.
- ✓ Promoted mechanization in the village via custom hiring services.
- ✓ Emerged as a progressive farmer inspiring others to adopt improved agricultural technologies.

Table 4.5.1 : Production and economics of crops under farmer practice 2019-20 (before CRAP)

Crop	Area (ha.)	Farmer practice	Yield (q/ha)	Net Income (Rs)
Rice	1.6	Transplanting	46.0	54800
Bajra	0.4	Broadcasting	31.5	47725
Wheat	1.2	Broadcasting	42.0	52800
Lentil	0.4	Broadcasting	15.0	40875
Chickpea	0.4	Broadcasting	15.5	41000
Mustard	0.4	Broad casting	9.0	24000
Pigeonpea	0.4	Broadcasting	10.0	34500
Tomato	0.4	Flat bed	130	147000
Buffalo	-	1	1500 ltr	82500
Custom hiring services		1 machine	Kharif and Rabi	55000 80000
			Total	6,60,200

Table 4.5.2 : Production and economics of interventions taken after CRAP 2024-25

Kharif Season								
SI. No.	Crop	Area (ha)	Intervention	Production (qt/ha)	Cost of cultivation	Gross Return	Net Return	BC Ratio
					In Rupees			
1	Arhar	0.8	Raised Bed	13.2	20000	99660	79660	3.98
2	Maize + Coriander	0.4	Raised Bed	55.3	26250	123042	96792	3.68
3	Bajra	0.8	Line sown	37.5	17560	98437	80877	4.60
4	Rice	2.0	Line transplanting	48.4	30360	111320	80960	2.66
Net Income(Kharif Season)							3,38,289	
Rabi Season								
1	Brinjal	0.25	Raised bed	170	95000	357000	262000	2.75
2	Tomato	0.50	Raised bed	190	90000	475000	385000	4.27
3	Cauliflower	1.00	Raised bed	180	84000	360000	276000	3.28
4	Vegetables pea	0.50	Line sown	96	60000	240000	180000	3.00
5	Wheat	1.00	Zero tillage	49.6	32520	104160	71640	2.28
6	Chickpea	0.50	Zero tillage	20.4	20630	102000	81370	4.00
7	Lentil	0.25	Zero tillage	19.4	18250	97000	78750	4.31
Net Income (Rabi Season)							13,34,580	
Summer Season								
1	Mung Bean	0.5	Line sown	6.7	17500	51900	34400	2.00
Net Income (Rabi Season)							34,400	
Grand Total Rs (Kharif + Rabi + Summer)							17,07,269	

Key Lessons and Way Forward

The journey of Mr. Jitendra Kumar Singh highlights the transformative role of scientific vegetable production and farm mechanization in improving farmers' socio-economic conditions. With institutional support from KVK Buxar, he successfully shifted from traditional agriculture to a technology-driven farming system, achieving higher productivity, enhanced income, and long-term sustainability. His story stands as a motivating example for farmers aiming to modernize agriculture and secure better livelihoods.



Fig 4.5.1 Line Sowing of Bajra through Seed Drill



Fig 4.5.2 inter cropping Coriander+Maize on Raised bed



Fig 4.5.3 Expert interaction with farmer



Fig 4.5.4 ZT sowing of Lentil var IPL 220

Contribution: Deokaran, Ramkewal and Harigovind, ICAR-RCER, KVK, Buxar



Chapter - 5

High-Value Crops and Commercial Agriculture

5.1 SCIENTIFIC CULTIVATION OF SWEET CORN AND EARLY POTATO FOR HIGHER PROFITABILITY

Profile of the farmer

Name: Mr. Jageshwar Kumar Mahto, Age: 44 years, Address: Korambe, Post – Morpa, Block – Gola, District – Ramgarh, Education: Matriculation, Mobile No.: 9661631553, Farming Experience: 25 Years

Situation Analysis / Problem Statement

Mr. Jageshwar Kumar Mahto was earlier engaged in traditional farming practices, primarily cultivating maize (local maize varieties) and paddy (Karhani, Sita) during the kharif season and potato (Chandramukhi/local seed tubers) during the rabi season. These crops provided low and uncertain income due to traditional sowing methods, delayed planting, and limited adoption of improved agricultural technologies. As a result, farm productivity remained low and the overall economic condition of the household continued to be weak.

Plan, Implementation and Support / Interventions

With continuous technical guidance, motivation, and advisory support from Krishi Vigyan Kendra (KVK), Ramgarh, Mr. Mahto gradually shifted from subsistence farming to scientific and market-driven agriculture. He adopted round-the-year cultivation of sweet corn (Sugar-75) over 2.0 acres and early potato cultivation (Kufri Pukhraj) over 3.0 acres. Scientific crop production technologies including line sowing, balanced nutrient management, integrated pest management, and timely irrigation. The intervention emphasized early sowing and harvesting to capture premium market prices and maximize returns. As a result of the interventions, his annual income increased to more than Rs. 7.00 lakh. Encouraged by the success, he is now planning to diversify further by initiating baby corn cultivation and linking the produce with organized retail marketing channels such as Reliance Mart.

Details of Practices Followed by the Farmer

- Cultivation of Sweet Corn variety Sugar-75 on 2.0 acres and Early Potato variety Kufri Pukhraj on 3.0 acres.
- Use of certified quality seed, timely sowing, and recommended seed rate for better crop establishment.
- Scientific land preparation, field levelling, and line sowing with recommended spacing.
- Application of well-decomposed FYM (5–8 t/acre) along with balanced fertilizer doses as per crop requirement.



- Adoption of Integrated Nutrient Management (INM) through combined use of organic and inorganic sources.
- Regular irrigation at critical growth stages and proper drainage management for efficient water use.
- Adoption of Integrated Pest and Disease Management (IPDM) through field monitoring and need-based plant protection measures.
- Timely intercultural operations, weed management, earthing-up in potato, and crop monitoring.
- Harvesting sweet corn at the milk stage and potato at market-preferred maturity to obtain premium prices.
- Crop diversification from traditional maize–paddy–potato system to high-value sweet corn and early potato cultivation.
- Market-oriented production planning, grading, and timely marketing to maximize profitability.
- Round-the-year cultivation and efficient utilization of available land resources for sustained income generation.

Results/Output

Adoption of improved varieties (Sugar-75 sweet corn and Kufri Pukhraj potato), early-season cultivation, and scientific crop management practices resulted in substantial gains in productivity and profitability. Sweet corn productivity increased from about 80–90 q/acre under traditional maize cultivation to 140–150 q/acre, while early potato productivity increased from 80–100 q/acre to 140–160 q/acre. Timely harvesting enabled the farmer to capture premium market prices, significantly enhancing returns. As a result, the farmer's annual gross income increased from Rs. 2.70 lakh to Rs. 10.20 lakh, registering an increase of Rs. 7.50 lakh (approximately 278%). The shift to high-value crops and improved market orientation also ensured a more stable and reliable income stream throughout the year. The enhanced income contributed directly to improved household well-being, better living standards, and increased financial security. Notably, the improved economic condition enabled Mr. Jageshwar Kumar Mahto to provide quality education to his children. Out of his four children, one son is currently employed as a software engineer, while another is pursuing higher education in New Delhi and preparing for the Civil Services examination, demonstrating the long-term socio-economic benefits and intergenerational impact of scientific farming interventions.

Economic Impact of Technology/Intervention

Early-season cultivation and crop diversification significantly enhanced farm profitability by ensuring premium market prices, reduced production risks, and stable income flow. Scientific crop management practices improved input-use efficiency and minimized losses, leading to sustained income growth. Overall, the intervention resulted in a marked improvement in the socio-economic status of the farmer's family, reinforcing agriculture as a reliable, profitable, and dignified livelihood option.

Table 5.1.1 : Change in Socio-economic parameters after technological intervention

Particulars	Before Intervention (Traditional Practices)	After Intervention (Scientific & Early Cultivation)	Impact / Change
Major Crops / Enterprises	Maize (Kharif), Paddy (Kharif), Potato (Rabi)	Sweet Corn (2.0 acres), Early Potato (3.0 acres)	Shift to market-oriented crops
Cropping Pattern	Seasonal, mono/limited cropping	Round-the-year & early-season cultivation	Better land use efficiency
Technology Adoption	Traditional sowing and management	Improved varieties, early sowing, scientific management	Enhanced productivity
Market Orientation	Local market, low price realization	Early harvest & premium market prices	Higher price realization
Average Annual Gross Income (Rs.)	~2.5–3.0 lakh	>7.0 lakh	Substantial increase
Net Income (Rs.)	Low and uncertain	High and stable	Improved profitability
Risk Level	High climatic & market risk	Reduced due to diversification	Income stability
Socio-economic Status	Limited financial security	Improved education & livelihood security	Improved quality of life

Table 5.1.2 : Enterprise-wise Economic Details

Sl. No.	Crop / Enterprise	Area (Acres)	Annual Income Before Intervention (Rs.)	Annual Income After Intervention (Rs.)	Incremental Income (Rs.)	Key Remarks / Impact
1	Maize (Kharif)	2.0	80,000	1,10,000	30,000	Improved varieties, timely sowing & balanced nutrient management
2	Paddy (Kharif)	2.0	1,20,000	1,50,000	30,000	Scientific crop management and higher productivity
3	Potato (Rabi – Traditional)	2.0	70,000	1,20,000	50,000	Early planting, quality seed and better market price

4	Sweet Corn (Round-the-year)	2.0	—	2,90,000	2,90,000	Early sowing and premium market price realization
5	Early Potato (Scientific cultivation)	3.0	—	3,50,000	3,50,000	High productivity, early harvest advantage
Total Farming System		5	2,70,000	10,20,000	7,50,000	Diversified, scientific and market-oriented farming



Fig 5.1 Scientific sweet corn and early potato cultivation by Shri Jageswar Kumar Mahto

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

5.2 FROM SMALL-SCALE TRADER TO MULTI-CRORE MUSHROOM ENTREPRENEUR: THE JOURNEY OF SHUBHAM MODI

Profile of the farmer

Name: Sri Shubham Modi, Age: 30 years, Address: The Mushroom Tub, Shed No.6, Sirtido Industrial Area, BIT Mesra, Ranchi; Mob. No: 7549160009,, Education: B.Com, Farming experience: 12 years



Situation Analysis / Problem Statement

Shri Shubham Modi, a young graduate, was struggling to secure a stable livelihood. In the initial phase, he started purchasing button mushrooms from Delhi and selling them in nearby local markets. This activity required significant physical effort but yielded only marginal profits. During this period, he developed interest in mushroom cultivation and aspired to establish his own production unit. In 2014, he began oyster mushroom cultivation, followed by small-scale button mushroom production in 2015. However, the venture did not achieve desired success due to lack of technical knowledge on scientific mushroom cultivation, raising production costs to about Rs. 2-3 per kg, and inadequate infrastructure and composting facilities.

Planning, Implement and Support / Interventions

In search of scientific guidance, Shri Modi approached, ICAR–RCER, FSRCHPR, Ranchi. Under expert guidance, he received:

- Hands-on training in scientific mushroom cultivation
- Technical knowledge on substrate preparation and compost management
- Guidance on environmental control and hygiene practices
- Information regarding bank loans and Government of Jharkhand subsidies for mushroom units

With proper technical support and financial planning, he established a commercial-scale mushroom production and compost unit, gradually overcoming earlier challenges related to production management, quality control, and marketing.

Details of Practices Followed by the farmer

Area of mushroom production unit is 5 acres having 12 rooms for compost bag preparation with production capacity of 1500 kg button mushroom per day.

Firstly, for growing mushroom spawn, compost is prepared from 15 tons of raw material using chicken manure (70%), gypsum (11-12%), urea (1%) and wheat bran (2-3%). The mixture is properly moistened, filled in an 8-9 ft pit, alternate-day turning for 7 days followed by tunnel pasteurization for 24 hours and compost is ready for use within about 16 days. After compost preparation, spawn is mixed and filled in growing rooms and incubated for 15 days at 24-26 °C. Casing is applied for 1-1.5 inches using soaked cocopeat and proper watering and humidity is maintained. Pinhead initiation started around the 23rd day and harvesting commenced from the 30 to 45 days under proper management.

Results/Output

The enterprise has evolved into a regular commercial-scale production system with stable market linkages and expanding demand.

Initial Phase (Up to 2018)	Current Status (2025)	Marketing Network
• Production: ~9 tonnes/month • Compost production: 250 tonnes per 3–4 months • Net income: Rs. 1–1.5 lakh per month • Employment: 1 permanent worker + 2 labourers	• Production: 45 tonnes per month • Annual production: 500–550 tonnes • Compost production: 200 tonnes per month • Daily production capacity: 1,500 kg • Employment generation: More than 25 labourers • Annual Gross Income: Rs. 7.0–7.5 crore • Annual Net Income: Rs. 2.0–2.5 crore	• > 3 tonnes sold daily in Ranchi • 0.63 tonnes supplied to districts like Bokaro, Jamshedpur, Hazaribagh, and Deoghar • 2.5–3 tonnes exported daily to Bihar and West Bengal • Average selling price: Rs. 150–225/kg in summer Rs. 150/kg in winter

Impact of Technology/Intervention

Proper technical guidance of mushroom cultivation enabled Shubham Modi to establish production infrastructure on a sustainable scale. Thus, mushroom cultivation became a regular source of income, improving his financial stability and standards of living. The intervention not only enhanced his income but also created opportunities for self-employment and inspired other youth to adopt mushroom farming as an income-generating activity. Generated significant local employment (25+ workers), strengthened supply chain across Jharkhand and neighboring states

Lessons Learned and Future Plans

- Technical knowledge is essential for successful mushroom production.
- Scientific compost preparation determines yield and quality.
- Understanding local market demand ensures stable income.
- Infrastructure investment is critical for commercial-scale success.
- Sustainable practices like substrate recycling improve long-term profitability.

The journey of Shri Shubham Modi demonstrates how scientific intervention, institutional support, and entrepreneurial determination can transform a struggling youth into a multi-crore agripreneur. His success reflects the immense potential of mushroom cultivation as a high-value, employment-generating enterprise in Jharkhand.



Fig. 5.2.1 Generative phase of Mushroom Unit



Fig 5.2.2 Package and Practices of Mushroom Cultivation

“What began as a small effort to earn a livelihood gradually evolved into a commercial mushroom enterprise through scientific guidance and perseverance.” – Subham Modi

(Contribution: Sudarshan Maurya, V. K. Yadav, Mahesh Kumar Dhakar, Amrita Soni, Kundan Kumar Singh and Debabrata Mahato, ICAR-RCER, FSRCHPR, Ranchi)

5.3 FROM FINANCIAL DISTRESS TO LEADERSHIP: A WOMEN-CENTRIC FPO SUCCESS STORY

Profile of the woman farmer

Name: Sujayanti Devi, Age: 44 years, Address: Gokul Dham, Darhatad, Itki, Ranchi, Mob.: 6203635776, Education: Intermediate, Farming experience : 30 years

Situation Analysis/Problem Statement

Earlier, Ms. Sujayanti Devi lacked awareness regarding suitable crop selection and improved cultivation practices. She attempted to earn her livelihood by renting tractors; however, the venture did not succeed due to financial and operational constraints. Consequently, she faced severe economic distress with no stable source of income or sustainable livelihood. Limited technical knowledge, absence of organized market linkages, and lack of collective support further constrained her growth.



There was a need for institutional guidance, skill development, and structured agribusiness opportunities to improve her economic condition.

Support/Intervention

To overcome these challenges, Ms. Sujayanti Devi sought support from Greenary Agrotech Producer Company Limited (FPO), formed and promoted by ICAR–RCER, FSRCHPR, Plandu, Ranchi. Through structured meetings and capacity-building programmes organized by the FPO and ICAR scientists, she gained:

- Knowledge on improved crop cultivation practices
- Technical training in sweet corn production
- Exposure to value addition and post-harvest management
- Understanding of collective farming advantages
- Insights into agripreneurship and market-oriented production

The FPO sensitized farmers about the benefits of collective input procurement, coordinated production, and collective marketing. Ms. Sujayanti Devi not only benefitted personally but also motivated other women to actively participate in the initiative.

Planning, Implementation and support/ Intervention

Ms. Sujayanti Devi played a key role in promoting collective cultivation and value addition of sweet corn under the FPO framework, which currently comprises 350 farmer members.

Key Interventions include

- Collective cultivation of sweet corn over 80 acres
- Establishment of a processing unit over 0.60 acre area
- Collaboration with Mother Dairy for market linkage
- Promotion of group-based agripreneurial approach

Practices followed by farmer

- Sweet Corn Varieties: Sugar-N-75, Duflora, Honey Gold, Nango, etc.
- Adoption of improved cultivation practices under technical guidance
- Recently initiated pea cultivation for diversification
- Organized seed distribution among member farmers

Post-Harvest & Value Addition

- Collection of produce at designated center
- Sorting and kernel separation (primarily handled by women farmers)
- Processing, packaging, freezing, and sealing
- Collective marketing through institutional linkage

Women play a central role in processing and value addition activities, thereby strengthening their participation in agribusiness operations.

Results/Output

Formation of a functional Farmer Producer Organization (FPO) enabled farmers to adopt collective farming practices, particularly in sweet corn cultivation in over 80 acre area. Farmers acquired technical skills in cultivating sweet corn and other crops through structured training

programmes conducted by ICAR-RCER, FSRCHPR, Plandu. Farmers initiated diversification by adopting pea cultivation and facilitated seed distribution among fellow farmers, strengthening input accessibility. Increased awareness and adoption of agri-preneurial approaches contributed to improved sustainability and collective decision-making among farmers.

Impact of Technology Interventions

Through this intervention, a dedicated processing centre was established and is being operated primarily by women farmers. The FPO generates an annual income of approximately Rs. 60 lakhs. It provides employment to nearly 150 women, and other farmers, significantly contributing to income generation and improvement in their overall standard of living. Beyond economic benefits, the initiative has created dignified livelihood opportunities for women who were abandoned or socially marginalized, enabling them to achieve financial independence and social inclusion.

Enterprise-wise economic details

Cultivation and Processing of Sweet Corn

- **Production:** 195 tonnes
- **Gross Return:** Rs. 64,35,000
- **Total Cost:** Rs.22,00,000
- **Net Return:** Rs.42,35,000
- **Benefit-Cost Ratio :** 2.9

The FPO generates approximately Rs 42 lakh annual income from a sweet corn only, demonstrating strong economic viability.

Lessons Learned

Through this intervention, farmers, particularly women, gained empowerment. The flexible working hours enabled them to balance their dual roles in the household and the workforce, while also enhancing their time management skills. Exposure to agriprenurship concepts encouraged women to think beyond traditional farming roles, understanding the value of creating income-generating opportunities through organized production and processing. The case of Ms. Sujayanti Devi illustrates how institutional support, collective action through FPOs, and value addition in agriculture can transform women's livelihoods. By integrating production, processing, and marketing, the initiative has not only generated substantial income but also fostered women's empowerment, social inclusion, and sustainable rural development.

Future Plan

The FPO plans to increase its membership base to include more farmers, thereby strengthening collective farming practices and enhancing bargaining power for inputs and market access. Since sweet corn cultivation is seasonal and cannot be sustained throughout the year, the FPO intends to introduce other interventions such as the cultivation of seasonal vegetables with staggered or all-year-round harvesting cycles. This will ensure continuous production, stable income for farmers, and better utilization of the FPO's processing and marketing infrastructure.

Spread of Technology

Ms. Sujayanti Devi actively promotes sweet corn cultivation and value addition techniques

among neighboring farmers. Her leadership has encouraged wider adoption of high-value crops and collective agripreneurship models in the region.



Fig. 5.3.1 Interaction with the FPO members



Fig. 5.3.2 Processing of Sweet Corn

"The enterprise is a source of pride, creating inclusive employment for women across age groups and motivating the expansion of interventions for sustainable, year-round livelihoods."-Sujoyanti Devi

(Contribution: V. K. Yadav, R. S. Pan, Jaipal Singh Choudhary, Amrita Soni, Kundan Kumar Singh and Debabrata Mahato, FSRCHPR, Ranchi)

5.4 HOME-SCALE MUSHROOM CULTIVATION FOR SUSTAINABLE LIVELIHOOD AND NUTRITIONAL SECURITY AMONG LANDLESS WOMEN: A SUCCESS STORY FROM JHARKHAND

Profile of the woman farmer

Name: Mrs. Sukarmani Kharkhusa, Age: 48 years, Address: Plandu, Namkum, Ranchi, Mob.: 9939782912, Education: 5th Class, Farming experiences: 6 years

Situation Analysis / Problem Statement

Mrs. Sukarmani Kharkhusa, a landless woman from Plandu village in Ranchi district, is the sole earner for her family of six. Before joining the Farmer FIRST Program (FFP) in 2019, she worked as a maid and laborer, earning just Rs. 6,000 per month, which was insufficient to meet her family's needs, forcing her children to drop out of school. In 2014, she had also taken a loan of Rs. 50,000 from a women's self-help group to manage household expenses.

Planning, Implementation and Support / Interventions

Her transformation began in 2019 when the Farmer FIRST Program team from ICAR-RCER, FSRCHPR, Ranchi visited her village and interacted with her family. During the visit, they



introduced various livelihood interventions and encouraged her to explore mushroom cultivation. After receiving training and support from the Farmer FIRST Program (FFP), she converted a separate room in her house into a mushroom production unit and started her enterprise with 150 bags. Under the FFP, ICAR-RCER, FSRCHPR, Ranchi provided her with essential inputs such as mushroom spawn, chemicals etc. The FFP team regularly monitored her mushroom unit and provided continuous technical guidance to ensure successful production.

Details of Practices Followed by the Farmer

She bought rice straw from market Rs. 7 per Kg and other inputs such as spawn, Bavistin, Formalin, PP bags are supported from ICAR-RCER, FSRCHPR. First of all she chopped the straw soaked in drum overnight and dried the straw. Filling of PP bag started and layer by layer upto 4-5 layers are filled, with alternate layer of chopped straw and spawn. After the spawn filling holes were made in the bags for perforation. Within 15-20 days mycelium grows and turns the bag white. She maintained the room temperature and humidity with no direct sunlight. Initially, she prepared racks; later, she adopted hanging bag systems to maximize space utilization. At present, she manages 3,100 bags, demonstrating remarkable growth.

Results/ Output

In the initial phase, she sold 150 kg of fresh oyster mushrooms at Rs. 150 per kg in local markets such as Rampur and Namkum. Although, her business slowed down during the COVID-19 lockdown due to reduced demand, she innovatively diversified into Mushroom badi and Mushroom pickles. By 2022, her enterprise regained momentum. She expanded into milky mushroom cultivation alongside oyster mushrooms to ensure year-round production. To promote sustainability and zero waste, she recycles spent mushroom substrate for vermicomposting, enhancing resource efficiency.

Impact of Technology/Intervention

Through mushroom cultivation, her family has achieved self-sufficiency, has become self-reliant, secured steady employment and has improved their income and nutritional standards. With the profits from her business, she repaid the loan to the women's self-help group. This financial stability allowed her to enroll her children in private schools for better education. In addition to mushroom farming, she also rears 25 poultry birds and 10 goats, further diversifying her livelihood. Adoption of effective marketing strategies like flexible pricing, rapport building with the localities, and delivery of mushrooms at the doorstep led to stable and sustainable business growth and sustained profitability. The consistently high Benefit-Cost (B:C) ratio demonstrated the economic viability of mushroom cultivation.

Lessons Learned and Future Plans

She has gained technical knowledge of mushroom cultivation, including the maintenance of optimum temperature and humidity, as well as marketing strategies and post-harvest management practices. She now plans to expand her enterprise to a capacity of 3,500 bags in the coming years. Being a landless woman, mushroom cultivation has become both her choice and necessity, providing dignity, social recognition, and economic empowerment without requiring her to leave her home. Today, she is respected in society as a successful agripreneur and a symbol of women-led rural transformation.

Table 5.4 : Economic returns through mushroom cultivation

Year	No. of bags (1kg dry substrate per bag)	Yield (in kg)	Average selling price (Rs./kg)	Cost of cultivation (Rs./kg mushroom)	Gross Income (in lakhs)	Net Income (in lakhs)	BC ratio
2020-21	150	133	150	30	0.19	0.15	4.40
2021-22	1500	1335	160	35	2.1	1.6	4.06
2022-23	2100	1869	180	40	3.3	2.5	4.05
2023-24	3000	2670	180	40	4.8	3.6	4.05
2024-25	3100	2950	180	40	5.3	4.0	4.28

"Being a landless widow with three daughters, mushroom cultivation has become the primary source of livelihood for my family." - **Sukarmani**

(Contribution: V. K. Yadav, A. K. Jha, Anirban Mukharjee, Amrita Soni, Kundan Kumar Singh, Debabrata Mahato, Prerna Nath, Awani Kumar Singh and Anup Das, ICAR RCER, FSRCHPR, Ranchi)



Fig. 5.4.1 Mushroom production under, Farmer FIRST Program



Fig. 5.4.2 Oyster Mushroom in hanging straw



Fig. 5.4.3 Monitoring of Mushroom unit



Fig. 5.4.4 Mushroom Badi making



Chapter - 6

Livestock and Allied Sectors

6.1 SCIENTIFIC PIGGERY FOR INCOME, RESILIENCE, AND SOCIAL DIGNITY: AN SCSP SUCCESS STORY

Profile of the farmer

Name : Sri Basant Kumar Ravi, Age: 36 years, Address: Udalu, P.O. Patanga, Block: Mandu, District: Ramgarh, Jharkhand Mob.: 9326121264, , Education: 5th Standard, Farming Experience: 3 Years, Innovative Farmers Award by Birsa Agricultural University, Ranchi



Situation Analysis / Problem Statement

Basant Kumar Ravi, a resident of Udalu village in Ramgarh district of Jharkhand, had migrated to Mumbai in search of livelihood and worked as a tailor in a small garment factory, earning around Rs. 20,000 per month. The COVID-19 pandemic abruptly disrupted his employment, forcing him to return to his native village in 2020 without any assured source of income. Belonging to a Scheduled Caste household, he faced acute financial insecurity due to limited livelihood options, dependence on low-return traditional agriculture, and the absence of local non-farm employment.

Recognizing vulnerability of SC community, Krishi Vigyan Kendra, Ramgarh selected Udalu village under SCSP to promote sustainable and location-specific livelihoods.

Plan, Implement and Support / Interventions

KVK, Ramgarh facilitated the establishment of a sustainable piggery enterprise by providing Basant Kumar improved Jharsukh pigs (2 females and 1 male), capacity building on scientific pig farming, vaccination and disease management support, and assistance in developing pig sheds and feeding infrastructure. Piggery, being well suited to the local agro-climatic conditions and culturally accepted in the region, proved to be an effective livelihood option.

Details of Practices Followed by the Farmer

The farmer adopted scientific pig farming practices as advised by KVK, Ramgarh, which included:

- Scientific housing with adequate space, proper ventilation, and drainage
- Balanced feeding management, utilizing locally available concentrate feed supplemented with green fodder
- Scheduled vaccination and regular deworming to prevent disease incidence
- Strict hygiene, cleanliness, and waste management practices
- Timely breeding, farrowing care, and systematic piglet management

Results / Output

Scientific housing, balanced feeding, regular vaccination and deworming, hygiene, and timely breeding led to the sale of three adult pigs (>1 quintal each), thirteen piglets and availability of eighteen two-month-old piglets for sale or rearing.

Impact of Technology/Intervention

Adoption of scientific pig farming practices under the SCSP intervention resulted in significant economic gains for the farmer. Key impacts included:

- Reduced mortality due to timely vaccination and disease management
- Faster growth and better body weight gain owing to balanced feeding and improved management practices
- Improved price realization through market linkage and advisory support provided by KVK, Ramgarh

The intervention enabled him to establish a viable enterprise with low land and capital requirements. Scientific management practices significantly improved productivity and income, helping him achieve livelihood security within his village. This SCSP intervention successfully transformed a distressed migrant worker into a self-reliant rural entrepreneur.

Enterprise-wise Economic Details

Pre-Intervention Economic Status

Income enhancement after the intervention was more than double.

Source of Income (Before)	Annual Income (Rs.)
Casual labour & tailoring work	1,80,000
Traditional agriculture (subsistence)	Negligible
Total Annual Income	< 2,00,000

Post Intervention

A. Vegetable Cultivation

Particulars	Area	Total Income (Rs.)
Vegetable cultivation	0.5 acre	25,000

B. Pig Farming (Scientific Management)

Particulars	Quantity	Rate (Rs.)	Total (Rs.)
Sale of adult pigs (>1 quintal)	12	15,000 / pig	1,80,000
Sale of piglets (25–30 kg)	45	4,000 / piglet	1,80,000
Sale/rearing value of weaners & growers	—	—	90,000
Manure & by-products	—	—	25,000
Gross Income from Pig Farming			4,75,000

Lessons Learned and Future Plans

Building on the success of the SCSP-supported piggery intervention, Basant Kumar Ravi plans to scale up his enterprise by expanding to 10 breeding sows to enhance income and livelihood stability. He aims to establish a bio-secure pig farming unit with waste recycling to ensure better animal health, environmental sustainability, and efficient resource use. Further, he intends to serve as a local resource person, facilitating peer learning and training Scheduled Caste youth in scientific pig farming practices, thereby promoting livelihood diversification, entrepreneurship, and wider replication of the SCSP model at the village level.



Fig 6.1 Activities under scientific pig management

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

6.2 ECONOMIC EMPOWERMENT THROUGH SCIENTIFIC BLACK BENGAL GOAT FARMING IN JAMUI, BIHAR

Profile of the farmer

Name: Pradeep Kumar, Age: 64 years, Address: Shastri Colony, Post: Jamui, District: Jamui (811307), Mob.: 9430029933, Education: M.Sc., Farming Experience : 20 years

Situation Analysis / Problem Statement

Despite long experience in livestock rearing, Mr. Pradeep Kumar faced several challenges in goat farming that limited productivity and income. The major constraints included:

- Low growth rate of goats
- Indiscriminate and unplanned breeding
- Lack of scientific feeding and breeding practices
- High kid mortality
- Inadequate veterinary care and health management

These issues resulted in poor herd performance, low survival rate, and limited economic returns from goat farming.

Plan, Implement and Support / Interventions

Mr. Kumar became associated with the Black Bengal Field Unit under the AICRP on Goat Improvement at ICAR-RCER, Patna in the year 2022.

Key support and interventions included

- Training on scientific goat farming and entrepreneurship development
- Regular technical guidance by ICAR scientists on housing, feeding, and breeding management
- Supply of an elite Black Bengal breeding buck for genetic improvement
- Support with mineral mixture, veterinary care, vaccination, deworming, and health monitoring
- Continuous handholding and field-level advisory services

These interventions enabled Mr. Pradeep to transition from traditional to scientifically managed goat farming.

Details of Practices Followed by the Farmer

- Breeding of does after attaining sexual maturity (10 months)
- Use of superior Black Bengal breeding buck supplied under AICRP
- Rotation of breeding buck every two years to avoid inbreeding
- Stall feeding using balanced concentrate, dry fodder, along with controlled grazing
- Feeding of milk replacer to kids to reduce early mortality
- Timely vaccination and regular deworming as per scientific schedule



Results/Output

Adoption of scientific goat management practices led to significant improvement in growth performance and survival:

- 36% increase in body weight at 9 months
 - Improved: 10.21 kg
 - Earlier: 7.50 kg
- 34.9% increase in body weight at 12 months
 - Improved: 12.95 kg
 - Earlier: 9.60 kg
- Reduction in kid mortality:
 - From 34% to 8%
- Reduction in overall mortality:
 - From 17.4% to 3.2%

Economic Impact of Technology/Intervention

Scientific breeding, feeding, and health management significantly enhanced income from goat farming as annual income from goat farming increased from Rs. 20,000 to Rs. 1,60,000/annum. This transformation was driven by improved survival, faster growth, and herd expansion.

Table 6.2.1 : Livestock Status

Livestock	Before AICRP Association (No.)	After AICRP Association (No.)
Cow	01	01
Goat	06	44
		(Female – 34, Male – 10)

Table 6.2.2 : Enterprise-wise Economic Details

Enterprise	Annual Income Before Association (Rs.)	Annual Income After Association (Rs.)
Agriculture	1,10,000	1,35,000
Goat Farming	20,000	1,60,000
Total Income	1,30,000	2,95,000

Lessons Learned and Future Plans

Lessons Learned

- Supplementation of mineral mixture significantly improves growth rate
- Feeding milk replacer to kids reduces mortality
- Scientific breeding and health management are critical for profitable goat farming

Future Plans

- Rearing of elite Black Bengal bucks
- Sale of breeding bucks to neighboring farmers
- Expansion of goat-based entrepreneurship

Mr. Pradeep Kumar's success demonstrates that scientific intervention under AICRP on Goat Improvement, combined with continuous technical support, can transform small-scale goat farming into a sustainable and profitable enterprise, enhancing livelihood security for rural farmers.



Fig 6.2 Black Bengal goat farming at by Sri Pradip Kumar, Jammui

(Contribution: Shankar Dayal and P.K. Ray, ICAR RCER, Patna)

6.3 ENHANCING LIVELIHOOD SECURITY OF A WOMAN FARMER THROUGH SCIENTIFIC GOAT MANAGEMENT

Profile of the woman farmer

Name: Mrs Bibi Rukhshana, Age : 45 years, Address: - Baisakha Ghat, Block :- Barari, Katihar, Pin:-854104, Mob.: 9525314542, Education: 5th Standard, Farming Experience: 20 years

Situation Analysis / Problem Statement

Analysis of situation of farmer showed following problems in Goatary.

- Growth rate of the animal is low
- Lack of scientific feeding and Breeding
- Higher kid mortality
- Lack of veterinary care

Plan, Implement and Support / Interventions

She has been associated with the Black Bengal field unit, AICRP on goat improvement since 2019. She was supported to successfully adopt and maintain the goat rearing based entrepreneurship. She was provided training for scientific Goat farming to encourage and develop skills. Scientist from ICAR Research Complex for Eastern Region, Patna provided her



technical input time to time for scientific housing, feeding and breeding management of goat. She has been provided elite Black Bengal buck for genetic improvement of goat present in her farm as well as nearby area. She has been supported with mineral mixture, veterinary care along with vaccination, deworming and various other inputs.

Details of Practices Followed by the Farmer

- Breeding of doe after attaining age of sexual maturity i.e. ten months.
- Mating with superior Black Bengal Buck
- Providing flushing ration one month before kidding
- Providing milk replacer to the kid to prevent mortality
- Timely vaccination and deworming

Results/Output

- 38% increase in 9 months body weight (10.5 kg vs 7.6 Kg)
- 34.7% increase in 12 months body weight (13.2 kg vs 9.8 Kg)
- Kid mortality and overall mortality is reduced from 36% to 8% and 3.6% from 18.7%, respectively.

Economic Impact of Technology/Intervention

Various technologies and intervention were used to improve livestock production. These include mating with a superior Buck, proper housing management, scientific breeding management, regular deworming, and timely vaccination. Her income from goat farming is increased from rupees ten thousand to rupees one lac twenty thousand.

Lessons Learned and Future Plans

- Supplementation of Mineral mixture increases growth rate of the animal.
- Feeding calf replacer to kids decreases mortality
- She is planning to raise bucks and sale them for breeding purpose.

Table 6.3.1 : Change in livestock population

Before Association with Project AICRP on Goat Improvement field unit ICAR RCER,Patna		After Association with Project AICRP On Goat Improvement field unit ICAR RCER,Patna	
Cow	01	Cow	01
Goat	02	Goat	22 (Female -14) (Male – 08)

Table 6.3.2 : Enterprise-wise Economic Details

Income Before Association with AICRP on Goat project (Rs.)			Income after Association with AICRP on Goat project (Rs.)		
Agriculture	Goat	Total	Agriculture	Goat	Total
1,30,000	10,000	1,40,000	1,50,000	1,30,000	2,80,000



Fig 6.3 : Mrs Bibi Rukhshana with her Black Bengal Goats

(Contribution: Shankar Dayal and P.K. Ray, ICAR RCER, Patna)

6.4 TECHNOLOGY-DRIVEN AQUACULTURE ENTERPRISES FOR STRENGTHENING FISH SEED SUPPLY SYSTEMS

Profile of the farmer

Name: Yetendra Kumar Kashyap, Age: 58 Years, Address: Bariyariya, Block: Sangrampur, District: East Champaran, State: Bihar- 845434, Education: M.A. Mob.: 9431409826, 7991102208, Farming Experience: More than 15 years

Situation Analysis / Problem Statement

The aquaculture sector in Bihar has long faced constraints related to limited availability of high-quality fish seed, dependence on traditional and inefficient production systems, and low adoption of scientific aquaculture practices. These challenges have restricted productivity, profitability, and the overall economic potential of fish farming for local farmers. Mr. Kashyap, a traditional farmer by background, owned about 25 acres of land, much of which remained underutilized due to non-scientific farming practices. Conventional agriculture failed to generate sustainable income, motivating him to explore aquaculture as an alternative, high-value enterprise capable of ensuring long-term livelihood security.

Plan, Implement and Support / Interventions

Building on his farming experience, Mr. Kashyap established “Kash Fisheries” with a clear



strategy centered on science-led innovation and institutional collaboration. The major interventions included:

- Establishment of a modern fish hatchery to address the regional shortage of quality fish seed
- Active technical collaboration with ICAR–Research Complex for Eastern Region, Patna for adoption of advanced aquaculture technologies
- Introduction of Biofloc Technology, Recirculating Aquaculture Systems (RAS), and Integrated Farming Systems (IFS) under scientific guidance
- Gradual scaling from small ponds to a 25-acre integrated aquaculture enterprise

Continuous mentoring and technical backstopping from ICAR-RCER played a critical role in systematic expansion and risk mitigation.

Details of Practices Followed by the Farmer

- **Hatchery Management:** Operation of a state-of-the-art hatchery with an annual capacity of 300 million spawn.
- **Scientific Stock Improvement:** Utilization of cryopreserved milt for cross-breeding and field-testing of specialized broodstock diets (CIFABROOD™) to enhance genetic quality and breeding efficiency, under the guidance of ICAR-RCER, Patna.
- **Advanced Production Systems:** Adoption of Biofloc technology, RAS for high-value species, and optimized aeration/water quality management.
- **Integrated Farming:** A circular economy model integrating aquaculture with goat, cow, duck, and poultry units, horticulture, and waste-to-compost innovation using water hyacinth.
- **Capacity Building:** Regular organization of training programmes, exposure visits, and on-farm demonstrations for farmers, extension workers, and entrepreneurs.

Results/Output

- **Production:** Annual output of 25 tonnes of table fish, 5 tonnes of yearlings, 3 tonnes of fingerlings, and 1 tonne of fry. On-farm feed mill production of 25 tonnes.
- **Infrastructure:** Development of one of Bihar's most advanced hatcheries on a 25-acre farm.
- **Knowledge Dissemination:** Direct training provided to over 5,000 fish farmers across Bihar.
- **Employment Generation:** Created direct and indirect employment for approximately 25 individuals.

Economic Impact of Technology/Intervention

Scientific aquaculture interventions significantly enhanced economic returns and stability:

- Total annual input cost: Rs. 5–6 lakh/ha.
- Gross annual income: Rs. 10–12 lakh/ha.
- Net annual profit: Rs. 5–6 lakh per hectare.
- Net annual income; Rs. 50-60 lakh/annum.

- Significant improvement in income stability and profitability compared to conventional farming.

This marked a substantial improvement over conventional farming systems, ensuring sustainable profitability.

Income Change

- **Before intervention:** Net income – Rs. 12-15 lakh/year
- **After intervention:** Net income – Rs. 50-60 lakh/year

Lessons Learned and Future Plans

The success of Kash Fisheries highlights that:

- Strong scientific collaboration and continuous innovation are essential for transforming traditional agriculture into profitable aquaculture enterprises
- Integrated and circular farming systems enhance sustainability, resilience, and economic stability
- Knowledge sharing and farmer-to-farmer extension accelerate technology adoption at scale

Future Plans include further expansion of hatchery capacity, diversification into high-value species, and strengthening farmer training and seed supply networks across eastern India.



Fig 6.4 : A Glimpse of “Kash Fisheries” centre at Sangrampur, East Champaran

(Contribution: Tarkeshwar Kumar, Kamal Sarma, S.K.Ahirwal and Vivekanand Bharti, ICAR RCER, Patna.



Chapter - 7

Women and Youth-Led Success Stories

7.1 CULTIVATING CONFIDENCE AND PROSPERITY: A TRIBAL YOUTH SUCCESS STORY

Profile of the farmer

Name: Raj Ranjan Bediya, Age: 27 years, Address : Lodhma, P.O. : Kundru Kala, District: Ramgarh (Jharkhand), Mob.: 7277574456 , Education: 12th, Farming experience: 6 years, Best Farmer Award from Birsa Agricultural University, Ranchi and ICAR-RCER, Patna

Situation Analysis / Problem Statement

Mr. Raj Ranjan Bediya, a young tribal farmer from a remote, tribal-dominated village of Ramgarh district, was primarily engaged in traditional, subsistence-oriented monocropping agriculture. Farming practices were largely based on inherited knowledge, with minimal use of improved inputs and technologies. The use of poor-quality planting material, imbalanced input application, and non-scientific crop management practices resulted in low crop productivity and steadily increasing cost of cultivation, leading to poor economic returns.

Continuous rice monocropping without crop rotation or diversification contributed to gradual soil degradation, declining soil fertility, and increased vulnerability to climatic variability. Limited exposure to improved agricultural technologies, inadequate access to quality inputs, and lack of regular technical guidance further constrained farm productivity and profitability. Consequently, farm income remained unstable, livelihood security was weak, and confidence in agriculture as a viable and sustainable livelihood option was low—a challenge commonly observed among tribal youth in the region.

Plan, Implementation and Support / Interventions

To address the identified constraints, Mr. Raj Ranjan Bediya was attached with the Tribal Sub-Plan (TSP) programme of Krishi Vigyan Kendra, Ramgarh, through a systematic, need-based, and holistic intervention strategy. KVK scientists conducted diagnostic field visits and developed a customized plan focusing on crop diversification, sustainability, and income enhancement.

The farmer received structured capacity-building trainings and continuous technical backstopping in vegetable cultivation, nursery raising, Integrated Farming Systems (IFS), commercial fruit production, animal husbandry, organic and natural farming, and adoption of modern agricultural technologies. To ensure experiential learning and confidence building, On-Farm Trials (OFTs) and Frontline Demonstrations (FLDs) were conducted directly on his fields, enabling real-time validation of improved practices under local agro-climatic conditions.

Regular field monitoring, seasonal advisories, and close handholding by KVK scientists facilitated timely problem-solving and effective technology adoption. This sustained intervention enabled a gradual transition from traditional monocropping to a scientifically managed, diversified, and sustainable farming system, laying a strong foundation for long-term livelihood security and economic growth.

Details of Practices Followed by the Farmer

- Crop Diversification: Shift from rice monocropping to diversified farming systems integrating cereals, pulses, oilseeds, vegetables, fruits, and allied enterprises
- Intercropping in Fruit Orchards: Integration of vegetables and pulses in young orchards to enhance income and land-use efficiency
- Organic and Natural Farming Practices: Use of organic manures, bio-inputs, and natural farming approaches to improve soil health and reduce chemical dependency
- Bio-mulching: Practice of bio-mulching in fruits and vegetables for moisture conservation, weed suppression, and soil health improvement
- Integrated Nutrient Management (INM): Balanced nutrient application combining organic and need-based inorganic inputs
- Scientific Crop Management: Adoption of recommended agronomic practices, timely field operations, and improved plant protection measures
- Year-round Vegetable Planning: Seasonal crop planning to ensure continuous production and regular cash flow
- Efficient Resource Utilization: Optimal use of land, water, and on-farm resources leading to enhanced productivity and sustainability

Results/Output

The systematic adoption of scientific and sustainable agricultural technologies under the guidance of KVK, Ramgarh led to significant improvements in the overall farming system of Mr. Raj Ranjan Bediya. Introduction of improved crop management practices, Integrated Nutrient Management (INM), drip irrigation, and bio-mulching resulted in substantial enhancement of crop productivity across cereals, vegetables, fruits, and allied enterprises. Efficient input use and adoption of organic and natural farming practices helped reduce the cost of cultivation, while improved crop protection measures minimized pest and disease incidence and associated losses. Off-season vegetable cultivation emerged as a major driver of income enhancement, enabling market supply during lean periods and fetching premium prices. Further, crop diversification and integration of livestock, poultry, and duckery improved resilience against climatic variability and market risks.

Overall, the farming system evolved into a scientifically managed, diversified, sustainable, and climate-resilient model, ensuring year-round production, improved resource-use efficiency, and long-term productivity.

Economic Impact of Technology/Intervention

The interventions implemented under the Tribal Sub-Plan (TSP) programme of KVK, Ramgarh resulted in a substantial increase in farm income through diversification, productivity enhancement, and efficient resource management. Adoption of high-value vegetables, fruit orchards, and allied enterprises significantly strengthened income streams and ensured regular cash flow.

As a result of these scientific interventions, Mr. Raj Ranjan Bediya's annual net income increased to Rs. 4.08 lakhs, representing a marked improvement over the pre-intervention period. The enhanced income improved his socio-economic status and enabled investment in farm

machinery, irrigation infrastructure, tools, quality inputs, and household assets. This economic upliftment not only improved his standard of living but also reinforced his confidence in agriculture as a viable, profitable, and dignified livelihood option for tribal youth.

Table 7.1.1 : Enterprise-wise Economic Details before Intervention

Crop / Enterprise	Area (acre) / Nos.	Production (q/lt)	Gross Income (Rs.)	Net Income (Rs.)
Cereals	2.00	25.00	45,000.00	30,000.00
Pulses	0.30	1.20	6,000.00	4,000.00
Vegetables	0.50	40.00	60,000.00	35,000.00
Poultry	50 Birds	0.40	12,000.00	8,000.00
Total	—	—	1,23,000.00	77,000.00

Table 7.1.2 : Enterprise-wise Economic Details after Intervention

Crop / Enterprise	Area (acre) / Nos.	Production (q/lt)	Gross Income (Rs.)	Net Income (Rs.)
Cereals	2.00	40.00	80,000.00	65,000.00
Pulses	0.30	2.40	12,000.00	10,000.00
Oilseeds	0.20	1.00	5,000.00	4,000.00
Vegetables	1.20	135.00	2,70,000.00	2,00,000.00
Fruit Orchard	2.30	5.00	25,000.00	18,000.00
Poultry	250 Birds	1.80	67,500.00	50,000.00
Duckery	55 Birds	0.55	22,000.00	16,000.00
Cattle	3 Nos.	700 lit	35,000.00	25,000.00
Other Enterprises	—	—	—	20,000.00
Total	—	—	5,16,500.00	4,08,000.00

Lessons Learned and Future Plans

Mr. Raj Ranjan Bediya's journey clearly demonstrates that scientific guidance, enterprise diversification, and adoption of sustainable farming practices can effectively transform small and tribal farming systems into economically viable and resilient enterprises. His experience underscores the critical role of continuous technical backstopping, timely adoption of improved

technologies, and efficient utilization of local resources in enhancing farm productivity and income.

Building on the achieved success, Mr. Bediya plans to expand off-season vegetable cultivation to access premium markets, strengthen organic and natural farming practices with certification, and adopt value addition and primary processing to further enhance profitability and market competitiveness. Beyond his own farm, he remains actively engaged in motivating and mentoring rural and tribal youth, promoting agriculture as a dignified, sustainable, and rewarding livelihood option.

His success has already inspired more than 10 tribal youths and over 40 farming households in the village to adopt diversified and sustainable farming practices, contributing to improved household income, nutritional security, and overall rural development—demonstrating strong replicability and scaling potential of the TSP intervention.



Fig 7.1.1 Inter cropping of groundnut under mango orchard.



Fig 7.1.2 Backyard poultry farming by Mr Ranjan Bediya

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

7.2 FROM FIELDS TO FINANCIAL FREEDOM: A WOMAN-LED SUCCESS STORY

Profile of the woman farmer

Name: Smt. Sangeeta Devi, Age: 34 years, Address :– Lodhma, P.O. : Kundru Kala, District : Ramgarh (Jharkhand), Education: 12th standard, Mob.: 6203998770, Farming experience: 14 Years, Best Women Farmer Award by BAU, Ranchi and the best progressive farmer award by the KVK, Ramgarh



Situation Analysis / Problem Statement

Smt. Sangeeta Devi, a woman farmer from Ramgarh district of Jharkhand, was primarily engaged in traditional agricultural practices characterized by the use of low-quality planting materials and non-scientific cultivation methods. These practices resulted in low crop productivity, rising cost of cultivation, and limited farm income, leading to economic insecurity. Limited exposure to modern agricultural technologies, climate-smart practices, and scientific crop management further constrained the growth and profitability of her farming enterprise. Despite having potential for diversification and value-based farming, these opportunities remained largely untapped—a situation commonly observed among women farmers in rural Jharkhand.

Plan, Implementation and Support / Interventions

To address the identified constraints, Smt. Sangeeta Devi was selected under the Tribal Sub-Plan (TSP) programme of Krishi Vigyan Kendra, Ramgarh for systematic capacity building and sustained technical support. A need-based intervention plan was implemented, which included:

- Structured training programmes on vegetable cultivation, nursery management, mushroom production, nutritional gardening, and organic and natural farming practices
- On-Farm Trials (OFTs) for onion varietal evaluation and Integrated Nutrient Management (INM) in tomato and sweet potato to assess suitability under local conditions
- Frontline Demonstrations (FLDs) on cereals and vegetables to enable experiential learning and technology adoption
- Regular field visits, seasonal advisories, and hands-on guidance by KVK scientists to ensure timely and effective implementation of recommended practices
- Support for Integrated Farming Systems (IFS) through promotion of allied enterprises such as goatery, poultry, and dairy to strengthen farm diversification and income security

This comprehensive intervention enabled Smt. Sangeeta Devi to gradually transition from traditional subsistence farming to a scientifically managed, diversified, and income-oriented farming system, laying the foundation for sustainable livelihood enhancement and women-led agricultural entrepreneurship.

Details of Practices Followed by the Farmer

- Climate-Smart Crop Practices: Adopted vegetable cultivation with plastic mulch, Direct Seeded Rice (DSR), intercropping, and mixed cropping to optimize land use and improve productivity.
- Integrated Farming System (IFS): Combined crop production with livestock enterprises, including 16 goats, 50 poultry birds, and 2 cattle, to diversify income.
- Efficient Resource Management: Improved water-use efficiency, nutrient management, and waste recycling to reduce input costs and environmental impact.

Results/Output

Adoption of scientific and diversified farming practices under the guidance of KVK, Ramgarh resulted in a substantial improvement in crop productivity, quality of produce, and overall farm sustainability. Scientific crop management, integrated nutrient management, and diversification reduced the cost of cultivation while enhancing input-use efficiency. Introduction of protected and off-season vegetable cultivation enabled the farmer to supply produce during lean periods and realize premium market prices.

The diversified farming system strengthened resilience against climatic and market risks and ensured year-round production and income. Owing to visible success and consistent performance, her farm emerged as a local demonstration and learning unit for women farmers and smallholders in the surrounding villages, facilitating horizontal spread of improved technologies.

Impact of Technology / Intervention

The interventions implemented by KVK, Ramgarh under the Tribal Sub-Plan (TSP) programme led to a remarkable improvement in the economic status of Smt. Sangeeta Devi. Through enterprise diversification, scientific crop management, and efficient resource utilization, her net annual income increased to Rs. 4,70,000, ensuring sustainable livelihood security. The enhanced income enabled reinvestment in agricultural tools, farm machinery, quality inputs, and infrastructure, further strengthening farm productivity and long-term sustainability. This economic empowerment has reinforced her confidence in agriculture as a profitable and dignified livelihood option, particularly for rural women farmers.

Lessons Learned and Future Plans

The success of Smt. Sangeeta Devi clearly demonstrates that women farmers can achieve economic empowerment through access to scientific knowledge, enterprise diversification, and adoption of integrated and sustainable farming systems. Her experience highlights the importance of continuous technical guidance, timely adoption of improved technologies, and efficient use of local resources in enhancing productivity, income, and livelihood security.

Building on her achievements, she plans to establish a quality planting material production unit for vegetables and selected timber species to meet local demand and generate additional income. She also intends to continue motivating and mentoring rural women and youth, promoting sustainable agriculture, natural farming, and nutrition-sensitive farming systems for long-term livelihood security and community resilience.

Table 7.2 : Enterprise-wise Economic Details

Sl. No.	Enterprise/ Component	Before Intervention (Traditional System)	After Intervention (Scientific & Diversified System)	% Increase / Impact
1	Field Crops (Rice, Pulses, Oilseeds)	Local varieties; low yield (Rice ~18–20 q/ha); Net income ~Rs. 60,000/year	Improved varieties, DSR, INM; Yield increased by 25–30%; Net income ~Rs. 1,10,000/year	~83%
2	Vegetable Cultivation	Seasonal vegetables (open field); Net income ~Rs. 40,000/year	Off-season & protected cultivation (mulch, improved varieties); Net income ~Rs. 1,50,000/year	~275%
3	Goatery	Not practiced	16 goats under IFS; Net income ~Rs. 85,000/year	New enterprise
4	Poultry	Backyard (10–15 birds); Negligible income (~Rs. 10,000/year)	Scientific rearing(50 birds); Net income ~Rs. 55,000/year	~450%
5	Dairy	1 local cow; Low milk yield; Net income ~Rs. 25,000/year	2 improved cattle; Better feeding & management; Net income ~Rs. 70,000/year	~180%
6	Mushroom Production	Not adopted	Seasonal mushroom production; Net income ~Rs. 30,000/year	New enterprise
7	Nutritional Garden	Limited for household use	Diversified nutrition garden; Savings ~Rs. 20,000/year	Improved nutrition & savings
	Total Annual Net Income	~Rs. 1,35,000 per annum	Rs. 4,70,000 per annum	~248%



Fig 7.2 : Rice, Goatry, Chilli, Tomato and Brinjal cultivation under IFS by Mrs Sanjeeta Devi

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

7.3 FROM TRADITIONAL PRACTICES TO INTEGRATED PROSPERITY: A YOUNG FARMER'S SCIENCE-LED SUCCESS STORY

Profile of the farmer

Name : Mr. Gangesh Kumar, Age: 37 years, Address: Beyang, Post Office – Kulhi, PS & Block:– Dulmi, District:– Ramgarh, Jharkhand, Mob.: 8102351114, Education: 12th Farming experience: 15 Years and a recipient of progressive farmers award by ICAR RCER in the year 2023.

Situation Analysis /Problem Statement

Mr. Gangesh Kumar, a young and enthusiastic farmer, was engaged in diversified farming involving crop production and livestock enterprises. Despite sustained efforts, his farming system was constrained by low productivity, limited adoption of scientific practices, and dependence on conventional methods, which resulted in unstable and inadequate income. The absence of integrated planning, inefficient resource utilization, and limited technical exposure affected the profitability and long-term sustainability of his farm. Recognizing these challenges, he sought scientific guidance and institutional support to transform his traditional farming into a resilient and income-generating enterprise.

Plan, Implementation and Support / Interventions

To address the identified constraints, KVK, Ramgarh provided systematic technical support and handholding to Mr. Kumar. Regular agro-advisories, capacity-building programmes, on-farm guidance, and exposure to modern agricultural technologies were extended. He received



training on scientific crop production, integrated farming systems, organic farming, nursery management, and efficient resource utilization. Participation in exposure visits to BAU, Ranchi and ICAR–RCER, FSRCHPR, Ranchi significantly enhanced his technical knowledge, confidence, and decision-making ability. Quality inputs and continuous advisory support enabled effective adoption of improved practices across enterprises.

Details of Practices Followed by the Farmer

Mr. Gangesh Kumar successfully adopted the following scientific and integrated farming practices:

- Scientific cultivation of rice, tomato, potato, chilli, sweet potato, and pigeon pea
- Integrated Nutrient Management (INM) and promotion of organic farming practices
- Scientific nursery management and off-season vegetable cultivation
- Adoption of scientific management practices in poultry and duckery units
- Training, pruning, and canopy management of fruit trees
- Use of improved propagation techniques and establishment of a nutritional garden
- Integration of crop and livestock enterprises for enhanced resource recycling, risk reduction, and income stability

Results/Output

The scientific interventions led to significant improvements, including:

- Enhanced productivity and quality of crops and livestock produce
- Successful diversification of farm enterprises
- Adoption of sustainable and organic farming practices
- Improved technical skills, knowledge, and confidence
- Increased farm income, livelihood security and resilience

Table 7.3.1 : Enterprise-wise Economic Details

SI. No.	Crop / Enterprise	Area(Acre) / Nos.	Net Income (Rs. /Year) Before Intervention	Net Income (Rs. /Year)After Intervention	Major Improvements After Intervention
1	Cereals (Rice etc.)	1.50	18,000	29,100	Improved varieties, INM, scientific crop management
2	Pulses (Pigeon pea etc.)	0.50	9,500	18,800	Quality seed, balanced nutrition and IPM
3	Oilseeds Mustard, Toria etc.	0.30	6,000	11,000	Scientific practices and timely operations
4	Vegetables (Tomato, Potato, Chilli, Sweet Potato etc.)	1.20	78,000	2,60,000	Scientific nursery, off-season cultivation, organic practices

5	Broiler Farming	5,000 birds/year	8,000	3,40,000	Scientific brooding, balanced feeding, batch-wise rearing, bio-security
6	Duckery	3,000 birds	12,500	35,000	Improved housing, feeding and survival rate
Total			≈ 1,32,000	≈ 6,93,900	Integrated farming ensured income stability and sustainability

Lessons Learned and Future Plans

The success of Mr. Gangesh Kumar clearly demonstrates that scientific farming, continuous capacity building, and strong institutional support are critical drivers of farm transformation. Regular interaction with KVK scientists, coupled with the adoption of integrated and organic farming practices, significantly enhanced farm productivity, income, sustainability, and resilience. Encouraged by the positive outcomes, the farmer plans to:

- Expand organic farming practices
- Further strengthen poultry and duckery enterprises
- Enhance integration among crop and livestock components
- Actively mentor and motivate fellow farmers by sharing his experiences

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

7.4. WOMEN-LED SCIENTIFIC FARMING AND NURSERY ENTREPRENEURSHIP IN A COAL MINE-AFFECTED AREA

Profile of the woman farmer

Name : Smt. Sunita Devi, Age: 46 year, Address: Arabasti, P.O. : Sarubera, P.S. & Block : Mandu, District : Ramgarh (Jharkhand), Education: 10th, Mob.: 8540002681, Farming experience: 16 years.

Situation Analysis / Problem Statement

Smt. Sunita Devi belongs to Arabasti village, a coal mine-affected area of Mandu block where soil degradation, declining fertility, and irregular water availability have adversely affected agricultural productivity. Despite over two decades of farming experience, she relied mainly on conventional cultivation practices for rice, maize, mustard, vegetables, and fruits.

Major constraints limiting farm performance included

- Poor nursery management, affecting seedling quality and crop establishment.
- Inadequate nutrient and pest management, resulting in crop losses.



- Limited exposure to modern agricultural technologies, including protected cultivation and organic practices.
- Low diversification, restricting income and year-round employment opportunities.

These constraints made it difficult for her to generate sustainable income and livelihood security from agriculture.

Plan, Implementation and Support / Intervention(s)

To overcome these challenges, Smt. Sunita Devi established linkage with Krishi Vigyan Kendra (KVK), Ramgarh, which provided systematic, need-based, and continuous technical support:

- Regular technical guidance on nursery management, scientific crop production, integrated nutrient management, and organic farming.
- Hands-on training in fruit crop management, canopy management, propagation techniques, and nutritional garden development.
- Exposure visits to BAU, Ranchi and ICAR-RCER, FSRCHPR, Ranchi, enabling learning of advanced agricultural practices and protected cultivation techniques.
- Support in integrated farming systems, combining crop production with allied enterprises such as vegetables, fruits, and poultry.

This structured support enabled her to gradually shift from traditional farming to a scientifically managed, diversified, and profitable agricultural system.

Details of Practices Followed by the Farmer

- Scientific Crop Cultivation: Adopted modern practices for rice, maize, mustard, cauliflower, potato, chilli, and watermelon, including balanced fertilization and timely pest management.
- Protected Nursery Management: Established a 250 m² nursery unit under shade-net/polyhouse, producing high-quality seedlings for her own farm and sale.
- Organic and Natural Farming: Used organic manures and biofertilizers to improve soil fertility and reduce chemical dependency.
- Integrated Nutrient & Pest Management: Applied site-specific nutrient management and preventive pest control strategies.
- Efficient Water and Crop Management: Ensured timely irrigation, drainage, and mulching to optimize productivity.
- Farm Diversification: Integrated vegetable, fruit, and poultry enterprises to stabilize income and reduce risks.

Results/ Output

- Higher Crop Yields: Improved productivity in cereals, oilseeds, vegetables, and fruits.
- Better Quality Produce: Enhanced marketability and premium pricing for vegetables and nursery seedlings.
- Reduced Losses: Lower incidence of pests and diseases due to timely interventions.
- Nursery-Based Entrepreneurship: High demand for her quality seedlings, providing

an additional income source.

- Model Farm: Her farm became a local example of diversification and scientific agriculture in a coal mine affected area.

Impact of Technology / Intervention

KVK interventions significantly improved her economic condition. Through improved nursery management, scientific crop practices, and diversification, her net annual income increased to Rs. 4.25 lakhs, ensuring livelihood security, income stability, and enhanced resilience against environmental and market risks.

Table 7.4 : Enterprise-wise Economic Details

Crop / Enterprise	Area (Acre) / No.	Net Income (Rs./Year) – Before Intervention	Net Income (Rs./Year) – After Intervention	Additional Profit (Rs)
Cereals	1.50	28,000	43,000	15,000
Pulses	0.30	6,000	9,000	3,000
Oilseeds	0.50	9,000	15,000	6,000
Vegetables	1.50	85,000	3,15,000	2,30,000
Poultry	40 Birds	3,000	6,000	3,000
Fruits & Vegetables (Nursery)	162 m ² / 0.40	–	37,000	37,000
Total	–	1,31,000 (Approx.)	4,25,000	2,94,000

Lessons Learned and Future Plans

Smt. Sunita Devi's experience clearly demonstrates that scientific guidance, continuous capacity building, and nursery-based entrepreneurship can successfully transform farming systems even in coal mine-affected and ecologically stressed areas.

Future Plans

- Expand the nursery unit and increase production of high-quality seedlings.
- Strengthen vegetable diversification and off-season cultivation.
- Motivate and mentor other women farmers to adopt protected cultivation, organic farming, and diversified agriculture for sustainable livelihoods.

Her journey reflects resilience, innovation, and women-led transformation, serving as a powerful role model for farming communities in mining-affected regions of Jharkhand.



Fig 7.4 Crop diversification through pigeon pea, mustard and vegetables in rabi season by Smt. Sunita Devi

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)

7.5 WOMEN EMPOWERMENT THROUGH SCIENCE-LED CROP-LIVESTOCK INTEGRATION :THE SUCCESS STORY OF MRS. GUDIYA DEVI

Profile of the woman farmer

Name: Mrs. Gudiya Devi, Age: 35 years, Address: Pandey Bigha, Block: Meskaur, Nawada, Bihar, Mob.: 8809687229, Education: 10th standard, Farming experiences: 10 years

Situation Analysis / Problem Statement

Earlier, Mrs. Gudiya Devi depended mainly on farming for her livelihood, but her limited exposure to scientific agricultural practices meant she relied on traditional methods of cultivation. She owned about 2.0 acres of land where crop productivity remained very low mainly due to local varieties, poor soil management, inadequate irrigation management, and unscientific farming



practices. As a result, she faced low production, high agricultural risk, meagre income, and livelihood insecurity, which severely constrained her socio-economic development.

Planning, Implementation, and Support / Interventions

With the technical guidance of scientists from ICAR–Research Complex for Eastern Region, Patna, Mrs. Gudiya Devi started improving her farming under the DST–SEED funded project titled “*Sustainable Improvement in Livelihood of Scheduled Caste Community through Development of Science, Technology and Innovation Hub in Meskaur and Sirdala Blocks of Nawada District, Bihar.*” The project was carried out in Janhaul village along with three other nearby villages where she received support through frontline demonstrations, training programmes, and exposure visits. The interventions focused on scientific crop production, livestock-based livelihood support, and capacity building, enabling her to adopt modern and sustainable farming practices. She also participated in field days and exposure visits, which helped her learn new and scientific farming methods. With this support, she was able to increase her crop production, improve her income, and strengthen her livelihood, bringing positive change to her life.

Pre-Intervention Situation

Before the intervention, Mrs. Gudiya Devi was following traditional crop management practices and unscientific goat rearing practices, which limited her income and productivity. Pre intervention situation included:

- ✓ Use of low-yielding traditional crop varieties
- ✓ Lack of scientific goat management practices
- ✓ No regular vaccination and deworming schedule
- ✓ Frequent animal health problems and low productivity
- ✓ Irregular and limited income

Scientific & Technological Interventions

Under the technical guidance of ICAR–RCER, Patna, through the Scheduled Caste Sub-Plan (DST, Government of India), the following scientific interventions were introduced to improve her livelihood:

- Availability of true Black Bengal breed goats
- Regular vaccination and deworming of goats
- Adoption of improved crop varieties and scientific management practices
- Crop diversification including paddy, wheat, chickpea, groundnut, moong, and vegetables
- Training on scientific feeding, housing, and breeding management of goats
- Continuous monitoring and technical support by scientists

These interventions helped her shift from traditional practices to a more scientific and sustainable farming system, leading to better productivity and income stability.

Technologies and Farming Practices adopted by Farmer

- Balanced fertilizer application based on soil test recommendations
- High-yielding crop varieties for major crops like Paddy (Rajendra Sweta and Swarn Shreya), wheat (DBW 187), Mustard (Pant Sweta) and Chickpea (Swarn Laxmi)
- Goat rearing using Bengal goats

- Regular vaccination and deworming of goats
- Efficient irrigation management and timely execution of all agricultural operations

Impact of Technological Interventions

By adopting scientific farming methods and integrated management practices for crop and goatry, she was able to greatly improve her production, increase profits, and achieve a more stable income.

Change in Income

- **Before intervention:** Net annual income – Rs. 77,080/-
- **After intervention:** Net annual income – Rs. 2.31 lakh (Crop + Goat)

Through the adoption of high-yielding crop varieties, improved agronomic practices, crop diversification, and scientific goat rearing, Mrs. Gudiya Devi nearly tripled her annual income, ensuring sustainable livelihood security and socio-economic empowerment

Table 7.5.1 : Income before intervention

Enterprises / Crops	Area (acre)	Production (qt.)	Gross Income (Rs.)	Net Income (Rs.)
Paddy (Mugadha)	2.0	27	59,400	43,400
Wheat (Local)	2.0	21.60	49,680	33,680
Total			109,080	77,080

Table 7.5.2 : Income after intervention

Enterprises / Crops	Area	Production (qt.)	Gross Income (Rs.)	Net Income (Rs.)
Paddy (Swarna Shreya, Rajendra Sweta)	2.0 acre	40.5	95,944	81,200
Wheat (DBW- 187, HD- 2967)	2.0 acre	32.4	78,570	64,570
Groundnut (Girnar-5)	140 m ²	0.3	2,179	1879
Chickpea (Swarna Laxmi)	594 m ²	1.0	5650	4450
Moong (IPM-2-4)	891 m ²	1.56	13678	11578
Vegatable (Tomato, Chilli, Branjal)	446 m ²	7.0	24500	18500
Total			220521	182921

Table 7.5.3 : Income from Black Bengal Goats

SI.No	Particulars	Per Goat	Total
01.	Number of kids per year from 4 goats	2 kids	8 kids
02.	Milk production period (days)	180 days	360 days
03	Milk yield (@0.25 litre per goat/day litre/day)	45 litre	90 litre
04.	Milk price (Rs. 150/litre)	Rs. 6750	Rs 13500
05	Income from sale of kids (8nos.)	Rs. 5000 / kid	Rs. 40, 000
06	Net Income from goat		Rs. 43,500

Impact and Achievements

- Annual income increased by three times which helped in improving livelihood security
- Increase in productivity due to adoption of high yielding crop varieties and scientific management practices
- Introduction of livestock enterprise like black bengal goat rearing
- Household income increased due to sale of goat kids within a short period
- Improved financial stability and savings potential

Key Learnings and Way Forward

This success story highlights the transformative impact of science-led interventions, institutional support, and capacity building in improving livelihoods of Scheduled Caste women farmers. Mrs. Gudiya Devi plans to further strengthen crop–livestock integration and act as a role model for other women farmers in the village, encouraging them to adopt scientific agriculture for sustainable and resilient livelihoods.

Future Outlook

- Expansion of animal based enterprises
- Wider dissemination of agricultural technologies through Farmer-to-Farmer Extension



Fig 7.5 Gudiya Devi with her rice, Chickpea crop and Goat

(Contribution: Dhiraj Kumar Singh, Ujjwal Kumar, Anirban Mukherjee, P C Chandran, R K Raman and Kumari Shubha, ICAR RCER, Patna)

7.6 PROMOTING MEDICINAL PLANT-BASED LIVELIHOODS THROUGH FARM-TO-PHARMA MODEL: THE ENTREPRENEURIAL JOURNEY OF SMT. SHWETA KUMARI

Profile of the Entrepreneur

Name : Smt. Shweta Kumari, Age: 40 years, Address: Raj Ngar, Pugu Panchayat, Palkot Road, Gumla, Mob.: +917004070520, E-mail: swetaprasad19990@gmail.com, Farming experience: 8 years experience in agribusiness and rural livelihood development. Received Agri-Entrepreneur Award in foundation Day of ICAR, RCER Patna on 22.02.2025



Situation Analysis / Problem Statement

Jharkhand is endowed with rich natural resources, particularly Non-Timber Forest Products (NTFPs) such as wild fruits, seeds, and medicinal plants. However, due to the lack of scientific cultivation practices, standardized processing, value addition, and organized market linkages, rural farmers—especially women—were unable to derive fair economic returns from these resources. Recognizing this untapped potential, Smt. Shweta Kumari envisioned building a structured enterprise centered on medicinal plant cultivation and value addition.

Planning, Implementation and Support / Interventions

To bridge this gap, she established M/s Pararth Community Farm Livelihood Development, focusing on conservation, cultivation, processing, and promotion of medicinal plants. In January 2024, she signed a Memorandum of Agreement (MoA) with ICAR–RCER, FSRCHPR, Ranchi under the Agri-Business Incubation (ABI) Project as an incubatee. Through this initiative, she received:

- Scientific and technical guidance
- Business mentoring
- Institutional handholding
- National-level networking support

Details of Practices Followed

- Collection of raw planting material (seeds and cuttings) directly from farmers' fields, ensuring scientific propagation and strict quality control
- Supply of medicinal plants to farmers and processing of harvested produce to manufacture different types of Ayurvedic medicines
- Branding and packaging of processed products and marketing them for sale
- Capacity building and employment generation for rural women
- Development of a farm-to-pharma supply chain model

Results / Output

- Creation of a sustainable medicinal plant nursery enterprise

- Employment generation for rural women farmers
- Improved availability of quality planting material for medicinal plants
- Promotion of medicinal plant cultivation in the region

Enterprise-wise Economic Details

Nursery Production of Medicinal Plants (Aloe vera, Ashwagandha, Tulsi, Kalmegh, Stevia)

- Gross Return : Rs. 3,00,000/-
- Input Cost : Rs. 1,00,000/-
- Net Profit : Rs. 2,00,000/-

The enterprise achieved a business turnover exceeding Rs. 3.0 lakh during 2024–25, significantly enhancing income levels for associated rural women and farmers.

Impact of Technology / Intervention

The integration of scientific nursery production, value addition, and institutional support transformed local medicinal plant resources into a sustainable and market-oriented enterprise. The intervention:

- Increased income of participating farmers and women
- Promoted conservation and scientific cultivation of medicinal plant
- Strengthened rural entrepreneurship
- Developed a replicable Farm-to-Pharma model

Lessons Learned and Future Plans

Smt. Shweta Kumari believes that training, innovation, and strong institutional support are key to transforming rural natural resources into sustainable enterprises. Her journey demonstrates how scientific intervention and entrepreneurial vision can convert traditional forest resources into a structured agribusiness model, empowering rural communities and promoting sustainable livelihoods.

Future Plans

- Scaling up the Farm-to-Pharma model
- Increasing farmer participation
- Expanding medicinal plant cultivation
- Strengthening national and international market linkages
- Enhancing product diversification and branding



Fig 7.6.1 Best Agri-Entrepreneur Award ICAR-RCER Patna Foundation Day



Fig 7.6.2 Mrs Shweta Kumari at Kisan Samridhi Mela 2025, FSRCHPR, Ranchi



Fig 7.6.3 Smt. Shweta Kumari conducting training and awareness programme for rural women on medicinal plant processing, branding and packaging.

(Contribution: Bhawna Patnaykuni and ABI Team, ICAR-RCER, FSRCHPR, Ranchi)



8.1 ALBINA EKKA, TRIBAL HEALER TO DOCTOR DIDI : CULTIVATING AYURVEDA, EMPOWERING A COMMUNITY

Profile of the women farmer

Name: Smt. Albina Ekka, Age: 59 years, Address: Kharsidag , Block: Namkum, District- Ranchi, Jharkhand, Pin- 834010, Education: 7th class, Mob.: 9065614332, Farming Experience: 8 Years, She was rewarded two times “Progressive farmers” reward on the occasion of Foundation day 2024 and 2025 of ICAR RCER, FSRCHPR, Patna



Fig 8.1.1 Product demonstration by Mrs. Albina Ekka

Situation Analysis / Problem Statement

Smt Albina Ekka is a hardworking tribal woman farmer who owns five acres of family land. Prior to 2018, she largely managed the farm using traditional practices and occasional seasonal wage work. Despite consistent labor, crop yields remained low, portions of the land were left fallow during certain periods, and household income was irregular. Limited technical knowledge, few off-season income opportunities, weak value-addition skills, and poor market linkages kept the household in a fragile financial situation. At times, the family relied on informal loans and occasional wage labor to meet basic needs, and children's education was affected by the uncertain income.

Planning, Implementation, and Support / Interventions

Key elements of the intervention included

- **Participatory farm diagnostic and planning:** Farmer FIRST Programme (FFP) team visited her farm and identified available resources, fallow patches, labour capacity and market windows.
- **Promotion of integrated enterprises:** FFP team promoted her for high value vegetables cultivation, oyster mushroom cultivation (short-cycle, high-value), composite fish culture in pond, backyard poultry, lac cultivation, vermicomposting, nursery raising for vegetables and timbre plants and cultivation of medicinal herbs for processing.
- **Provision of critical inputs:** Mushroom spawn, polypropylene (PP) bags, formalin, bavistin, fish fingerlings, poultry chicks, brood lac, vermi-bed, quality seed/ planting materials for vegetables, timbre and medicinal herbs were provided to her.
- **Capacity building:** Hands-on trainings on mushroom cultivation; composite fish culture; poultry husbandry and basic animal health; vermicomposting, simple processing (mushroom *badi*, pickles, tomato ketchup, etc.); packaging and basic bookkeeping and marketing were provided.

- **Institutional linkages:** Facilitation of contact with Jharkhand State Livelihood Promotion Society (JSLPS), ICAR-NISA, ICAR-IIAB, KVK and support for the formation and functioning of a Farmer Producer Organisation (FPO) for collective input purchase and marketing.

The strategy focused on combining rapid-return activities (high value vegetables, oyster mushroom etc.) that provide quick cash flow with medium-term enterprises (fish, poultry, lac cultivation, herbal processing etc.) that stabilize income across seasons. Value-addition training was facilitated so that Albina could capture more value rather than relying purely on raw commodity sales.

Details of Practices Followed

Albina's integrated farming system model emphasizes resource efficiency and recycling:

- **Herbal cultivation and processing:** Selected medicinal/herbal plants are cultivated in small beds. Processing includes drying, preparation of medicines and packaging under hygienic conditions as taught by Missionaries.
- **High value vegetable cultivation:** Grafted tomato, french bean, pencil bean, strawberry, watermelon, cucumber, etc. were successfully grown. Dried leaves of vegetables were used in vermicomposting. Poultry birds pick up and eat insects in the vegetable fields and help in insect pest management.
- **Mushroom cultivation:** Oyster mushroom is produced in a dedicated room using straw substrate filled into PP bags. Best results were obtained during October-March. Spent substrate is used for vermicompost production. Vermicompost is applied in the vegetable farm. Keeping in view consumer preference of button mushroom in the market, she initiated purchasing it from local industry at cheaper price and selling in local haat at higher price.
- **Fish culture:** Small earthen pond(s) were constructed/ renovated on marginal low-lying areas and stocked with composite fish culture (Rohu, Catla, Mirgala and Common Carp). Feeding is based on affordable local feeds and farm-made supplements.
- **Poultry:** Backyard poultry of a small flock (20–30 birds) provides eggs and occasional birds for sale; poultry manure is composted and applied in vegetable fields.
- **Lac Cultivation:** She received training on lac cultivation in ICAR-NISA and initiated cultivation on 37 (30 small and 7 big trees) ber plants. On an average, large ber tree yielded 20 kg and small tree 3 kg scrap lac which were sold in the local haat.
- **Value-addition:** When fresh sales are constrained, Albina processes mushrooms into badi and pickles, and prepare tomato ketchup, packages herbal products in small, labelled packs for local markets.

Throughout, the Farmer FIRST team provided critical inputs, frequent technical mentoring, field visits, arranged exposure visits and market orientation sessions to support market linkages. These practices raised cropping intensity on her five-acre farm, improved soil fertility using vermicompost, and created diversified income streams with staggered cash flows that reduce seasonal risk.

Results/Output

- **Substantial income enhancement:** Integrated enterprises and value addition substantially increased household cash flows. Albina repaid earlier informal loans and reinvested profits into farm enterprises and family needs.
- **Land utilization and higher cropping intensity:** Previous rice-fallow land was converted into vegetable farm. Three vegetable crops were grown in the same piece of land, thus cropping intensity increased.
- **Improved household nutrition:** Regular availability of protein and minerals -rich foods (vegetables, fish, eggs, mushrooms) improved dietary diversity and nutrition security.
- **Women's empowerment and local leadership:** Albina emerged as a community leader-she helped in formation of women led FPO, conducts trainings for other women, and participates in marketing and negotiation.
- **Employment generation and reduced distress migration:** Year-round on-farm work reduced seasonal migration for wage labour and created local employment opportunities for family members and other women.
- **Sustainable resource management:** Spent substrate reuse (vermicomposting), manure management and mixed enterprise synergies improved farm resource efficiency and soil health.
- **Market linkages and value-creation:** Processing, packaging and aggregation of produce in FPO improved price realization and reduced transaction costs for small volumes of produce.
- **Replication potential:** The integrated model proved replicable - several neighbouring women adopted mushroom cultivation; some households initiated lac cultivation and simple processing after seeing Albina's success.

Impact of Technology/Intervention

Before adopting the Integrated Farming System (IFS) model, Albina's farm-generated annual income from five acres of land was Rs. 35,000 only. After implementing the IFS model, her income increased to Rs. 12,85,130, enabling loan repayment, reinvestment, and household improvements. She also joined as an incubatee in the Agri-Business Incubation Project of ICAR-RCER, FSRCHPR, Plandu, focusing on ITK-based Ayurvedic formulations and mushroom value addition. Albina obtained a license from the Food Safety and Standards Authority of India (FSSAI) to sell food products and registered her company as "Albina Agro & Ayurvedic Products." She received training from missionaries to prepare herbal medicines and provide treatments for conditions such as body pain, malaria, typhoid, hair fall, and paralysis, earning her the popular title of "Doctor Didi." Additionally, with support from LEADS (Life Education and Development Support), she produces LED bulbs. Albina provides year-round employment to more than ten women in the preparation of herbal medicines and LED bulbs and trains budding entrepreneurs in these enterprises. As a result, her socio-economic status has significantly improved, and she has emerged as a role model for women-led rural entrepreneurship.

Enterprise-wise Economic Details

Table 8.1 : Production and income from different components during 2024-25 are mentioned below:

Albina Ekka IFS Model 2024-2025 (Area: 5 acres)					
Intervention	Production (kg/pcs/haat)	Market Price (Rs.)	Gross income (Rs.)	Expenditure (Rs.)	Net income (Rs.)
Herbal Product	3200 kg /acre	70	2,24,000	25,000	1,99,000
Poultry (Desi)	500	500	2,50,000	30,000	2,20,000
Fishery	150	200	30,000	4,000	26,000
Mushroom Trading	5,475	200	10,95,000	8,21,250	2,73,750
Lac Cultivation	375	1,000	3,75,000	1,07,500	2,67,500
Nursery	1,500	50	75,000	10,000	65,000
High Value Vegetable Cultivation (French bean)	2,000	200	4,00,000	1,80,000	2,20,000
Paddy	1,520 kg/acre	19	28,880	15,000	13,880
Total annual net income					12,85,130

Institutional strengthening and leadership:

With active support from the Farmer FIRST Programme, Albina strengthened linkages with JSLPS for the formation of a farm women's group and a Farmer Producer Organization (FPO), and for the establishment of a mini cold storage facility in the village. She also collaborated with other organizations, including ICAR-NISA for lac cultivation and the State Development Department for the sale of timber plants and herbal medicines. Albina serves as an active member of the Board of Directors of the Namkum Farmer Producer Company, which aggregates inputs, distributes them among members, collects produce, markets it, and shares profits. In addition, she has assumed a leadership role within the FPO and now trains neighbouring women farmers, sharing her knowledge and experience to promote sustainable, women-led agricultural enterprises. Also she recognised as “Doctor Didi” for her Ayurvedic herbal medicines.

Lessons Learned and Future Plans

Prior she work as daily wages labour. Since 2018 she is engaged in agricultural practices in integrated farming model and generating higher income from diversifying the source of income.

She wants to generate more employment for villagers. She is interested to lease more lands for spreading the technologies and agricultural practices. She is also interested for trading of local fruits processed products such as jack fruit pickle , mahua laddu, etc..

She inspired 10 farmers for lac cultivation, also changed mind-set of 13 women towards business, and she also provided training to more than 1000 tribal women for business ideas, preparation of Mahua, Maduwa laddu, mushroom products, tomato ketchup, etc.



Fig 8.1.2 Integration of enterprises leading to profitable farming

(Contribution: P. Bhavana, V. K. Yadav, Vikas, Amrita Soni, Kundan Kumar Singh, Debabrata Mahato, Awani Kumar Singh and Anup Das, ICAR-RCER, FSRCHPR, Ranchi)

8.2 FROM UNEMPLOYMENT TO RS. 2 CRORE ENTERPRISE: THE NURSERY REVOLUTION OF SHRAWAN KUMAR GUPTA

Profile of the women farmer

Name: Shrawan Kumar Gupta, Age: 53 years, Address: C-92, Harmoo Housing Colony, Ranchi, Education: B.A, Mob.: 9431360542, 6207106199, Email: phaludyognursery@gmail.com, Farming Experience: 21 years, Recipient of following recognitions and awards:

- Innovative Horticultural Farmer Award, 2nd National Meet, ICAR-IIHR, Bengaluru, 2013
- Jagjivan Ram Abhinav Kisan Puraskar (Innovative Farmer Award), 2018–ICAR, New Delhi
- Innovative Krishak Samman, Krishi Unnati Mela, IARI Pusa, 2017
- Innovative Farmer Award, DISHA-2018, Ranchi



Situation Analysis / Problem Statement

Mr. Shrawan Kumar Gupta initially faced significant livelihood challenges as an unemployed youth. Although his parents helped him establish a grocery shop, the venture did not succeed due to lack of interest and limited engagement. However, he had a natural inclination toward tree plantation and horticulture.

In 1995, he visited ICAR–Research Complex for Eastern Region, Farming System Research

Centre for Hill and Plateau Region (FSRCHPR), Plandu, Ranchi, where he interacted with scientists regarding the establishment of a fruit nursery. These interactions sparked his interest in scientific nursery management and modern propagation techniques.

During 2003, he regularly visited ICAR-RCER for six months to gain hands-on training in grafting, air layering, budding, and nursery plant management. This systematic skill development laid the foundation for his entrepreneurial journey in horticulture.

Planning, Implement and Support / Interventions

After acquiring technical confidence in plant propagation techniques (grafting, air layering, preparation of polythene bags with appropriate fillers, etc.), Mr. Gupta developed a structured plan based on scientific guidance received from ICAR-RCER, FSRCHP, Ranchi.

- Faced initial constraints of limited capital and market access.
- Gradually expanded operations through quality assurance and networking.
- Developed strong linkages with government departments and began supplying nursery plants as per institutional demand.

Details of Practices Followed by the Farmer

He has 10 ha of own land and taken 20 ha on lease. He established fruit plants nursery in 20 ha, timber plant nursery in 1 ha, grows field crops and vegetables in 8 ha and rest land is allocated for building and other infrastructure. He is preparing six lakhs nursery plants of fruits annually. Important fruit plants and their varieties are mentioned below:

Mango- Amrapali, Malika, Langra, Himsagar, Chausa, etc. Guava- Allahabad Safeda, Lucknow-49, Taiwan Pink, Litchi- Shahi and China, Jamun- Baduni, KG-10, Bel- Pant Sujata, Jackfruit- Baramashi Pink Papaya-Ranchi local, He is also preparing 50,000 nursery plants of Mahogany (African) annually. He is also growing paddy, wheat, ragi (BM-3) and vegetables in 8 ha for home consumption and social welfare.

Scientific Nursery Practices

1. Use of polythene bags of sizes: 8"x10", 9"x11", and 10"x12".
2. Fillers include paddy straw, ash (bhusha), FYM, and soil, thoroughly mixed and solar-sterilized.
3. Sale of two-year-old plants ensuring nearly 100% survival rate.
4. Maintenance of mother block for assured scion quality

Results/ Output

- 6 lakh nursery plants of fruits
- 40,000 nursery plants of timber

Field crops (paddy, wheat, ragi BM-3) and vegetables grown over 8 ha are primarily used for home consumption and social welfare activities.

Impact of Technology/Intervention

- Achieved annual net income of approximately Rs. 2 crore.
- Generated round-the-year employment for 50 labourers.

- Established himself as a leading nursery entrepreneur in Jharkhand.
- Contributed significantly to horticultural development and orchard expansion in the region.

Table 8.2 : Economic details of nursery interventions

Input Cost	Output	Net Income (Rs)
• Polythene bags: Rs. 60.0 lakhs • Fillers (manure, fertilizers, etc.): Rs. 20.0 lakhs • Rootstocks: Rs. 100.0 lakhs • Pest management: Rs. 40 lakhs • Labour: Rs. 82.13 lakhs • Miscellaneous (electricity, machinery repair, etc.): Rs. 246.63 lakhs Total Cost: Rs. 7,28.76 lakhs	• Average selling price (except papaya): Rs. 150 per plant • Papaya: Rs. 25 per plant • Gross Income: Rs. 928 lakhs per annum	199.24 lakhs

Lessons Learned and Future Plans

- Scientific skill development and institutional linkage are critical for nursery entrepreneurship.
- Quality planting material ensures high survival rate and customer trust.
- There is a strong need for structured training infrastructure to equip budding entrepreneurs with nursery management skills.
- Conservation of endangered species (e.g., Kendu) should be prioritized.
- Intercropping high-value vegetables between fruit rows during orchard establishment enhances early income and resource utilization.

The success of Mr. Shrawan Kumar Gupta demonstrates how scientific nursery management, institutional support, and entrepreneurial vision can transform unemployment into a high-income enterprise. His journey exemplifies how technology adoption, quality assurance, and market linkage can create sustainable livelihoods while generating employment and social recognition.

Spread of technology

He has provided technical expertise to 40 budding entrepreneurs in establishing nurseries. His nursery plants are being grown in more than four thousand hectares area in Jharkhand, Bihar and W.B.

“The nursery business has given me immense satisfaction, social recognition, and strong economic returns, and I have developed a deep fondness for this enterprise.” - Shrawan Kumar Gupta



Fig 8.2.1 Interaction meeting with RAC team



Fig 8.2.2 RAC team discussing with RAWE students at Fal Udyog Nursery



Fig 8.2.3 Nursery plants of Mango



Fig 8.2.4 Fal Udyog Nursery

(Contribution: V. K. Yadav, Amrita Soni, Kundan Kumar Singh, Debabrata Mahato, Awani Kumar Singh and Anup Das, ICAR-RCER, FSRCHPR, Ranchi)

8.3 VEGETABLE NURSERY PRODUCTION THROUGH SOILLESS AND GRAFTING TECHNOLOGIES: THE ENTREPRENEURIAL JOURNEY OF MR. BISHUN MURMU

Profile of the farmer

Name: Mr. Bishun Murmu, Age: 32 years, Address: Sarwaha, Kasiyadih, Hazaribagh, Jharkhand, Education: Master's Degree in Rural Development, Mob No.- +919934333551, Email- bishunm43@gmail.com, Farming experiences: 8 years

- Honoured by Hon'ble Chief Minister, Shri Hemant Soren in Aapke Sarkar Aapke Dwar Programme during 2022
- Received Agri-Entrepreneur Award in foundation Day of ICAR, RCER Patna on 22.02.2025

Situation Analysis / Problem Statement

Farmers in Jharkhand face an acute shortage of quality planting material due to the limited



availability of scientifically produced, disease-free seedlings. Conventional soil-based nurseries often fail to supply healthy, uniform, and disease-free plants in sufficient quantity, resulting in reduced crop productivity and lower farm income. Recognizing this gap in the supply chain, Mr. Bishun Murmu envisioned establishing a scientific nursery enterprise based on modern technologies.

Planning, Implementation, and Support / Interventions

To address the problem, he adopted soilless nursery production technology and scientific grafting techniques in solanaceous crops. He was registered under the Agri-Business Incubation (ABI) Project of ICAR–RCER, FSRCHPR, Plandu, Ranchi, where he received scientific mentoring and technical guidance under the supervision of Dr. A. K. Singh and Dr. P. Bhavana. Through institutional support, he developed expertise in:

- Protected cultivation
- Nursery management standards
- Large-scale seedling production
- Scientific plant health management

Details of Practices Followed by the Farmer

- Soilless nursery production system
- Adoption of scientific grafting techniques in solanaceous crops
- Production of uniform, disease-free, and high-survival seedlings
- Maintenance of standard nursery hygiene and quality control protocols
- Large-scale protected cultivation under polyhouses
- State-wide marketing and supply of planting material

Results / Output

- Establishment of a successful nursery enterprise “Murmu Hi-Tech Nursery”
- MSME-registered nursery enterprise with Production capacity of 25 lakh plants per year
- Increased demand and trust among farmers for grafted vegetable plants
- Expansion of market reach across Jharkhand

His enterprise has become a reliable source of high-quality planting material for vegetable growers.

Enterprise-wise Economic Details during (2025–26)

Total area : 2600 square meter

Particulars	Details
Protected cultivation area	2600 m ² (3 polyhouses: 1000 m ² + 1000 m ² + 600 m ²)
Input Cost	Rs. 35.00 lakh
Production	25 lakh plants per year
Selling Rate	Rs. 2 per plant
Gross Return	Rs. 50.00 lakh
Net Profit	Rs. 15.00 lakh

The enterprise demonstrates strong economic viability and scalability

Impact of Technology / Intervention

The adoption of soilless nursery production and grafting technology has enhanced seedling survival rate, improved plant health and uniformity, increased farmers' confidence in quality planting material, strengthened market demand and generated substantial income and ensured long-term enterprise sustainability. His nursery plants are now being cultivated in multiple districts of Jharkhand, contributing to improved vegetable productivity across the state.

Lessons Learned and Future Plans

Mr. Murmu believes that scientific innovation, institutional support, and entrepreneurial vision can transform nursery-based farming into a profitable and sustainable agribusiness.

Future Plans

- Scaling up grafted plant production
- Expanding farmer linkages across districts
- Strengthening supply chains for disease-free vegetable seedlings
- Promoting adoption of modern nursery technologies state-wide



Fig 8.3.1 Agri-Entrepreneur Award, ICAR-RCER Patna Foundation Day 2025



Fig 8.3.2 Stall at Kisan Samridhi Mela 2025, FSRCHPR, Ranchi



Fig 8.3.3 Hi-Tech Nursery of Sri Vishnu Murmu



Fig 8.3.4 Hi-Tech Nursery visit & sample showing

"The vegetable nursery enterprise emerged as a turning point in my life, and I plan to expand this venture to support needy farmers."- **Mr. Bishun Murmu**

(Contribution: Bhawna Patnaykuni and ABI Team, ICAR-RCER, FSRCHPR, Ranchi)

8.4. BEEKEEPING TRANSFORMATION OF HOUSEHOLD INCOME AND EMPLOYMENT GENERATION: A SUCCESS STORY FROM BUXAR

Profile of the Farmer

Name: Mr. Manoj Kumar, Address: Rasen Block: Rajpur, District: Buxar, Bihar, Mobile: 9939375217

Background and Situation Analysis

Mr. Manoj Kumar, a resident of Village Rasen in Rajpur Block of Buxar district, adopted beekeeping as a sustainable livelihood option after enhancing his skills and technical knowledge through capacity-building and awareness programmes organized by Krishi Vigyan Kendra, Buxar. With continuous efforts and technical backstopping from KVK, he was able to increase honey productivity over time.

However, in the initial phase, the absence of a honey processing unit and organized marketing channels compelled him to sell raw and unprocessed honey at lower prices, limiting his profit potential. Recognizing these constraints, KVK facilitated technological and institutional interventions that helped him transition from a small-scale producer to a successful rural entrepreneur.

Technologies Promoted and Institutional Support

After completing professional training, Mr. Kumar gained in-depth knowledge about *Apis mellifera* (European honey bee)—its biology, life cycle, foraging behaviour, and high nectar and pollen collection efficiency. The species proved highly suitable for the rice–wheat cropping system prevalent in the south-western region of Bihar. KVK, Buxar extended continuous institutional support by providing training certification and technical guidance. Under the State Government's Beekeeping Promotion Programme, he received 50 bee hives with four-frame colonies, enabling him to scale up production.

A major milestone was achieved in 2022 with the establishment of a honey processing unit (capacity 5–6 quintals per hour) at his centre, “Rajpur Madhu Utpadan Evam Madhu Box Utpadan Sahkaari Samiti.” This facility was set up with financial assistance from the District Industries Centre through convergence efforts and persistent follow-up by KVK. The processing unit significantly enhanced product quality, shelf life, and market value.

Economic Impact of Technological Interventions

A strategic shift from raw honey sale to processed and branded honey marketing resulted in a remarkable turnaround. Within four years, the enterprise witnessed **nearly eight-fold growth in net income**, demonstrating the profitability of scientific beekeeping integrated with value addition.

Income Growth

- Before Intervention (2021): Rs. 5.14 lakh
- After Intervention (2024): Rs. 42.37 lakh



Table 8.4 : Progress of honey bee production and profitability during 2021 to 2024

Year	No of bee Hives	Raw Honey production (Kg.)	Processed honey (Kg.)	Cost of production (Rs.)	Gross return (Rs.)	Income from Bee wax (Rs.)	Net income per annum (Rs.)	Daily Employment generation (man-days)
2021	250	7,500	0	5,35,650	9,00,000	1,50,000	5,14,350	06
2022	400	12,000	10,800	9,00,000	27,00,000	2,40,000	20,40,000	10
2023	650	19,250	17,325	15,40,000	46,77,750	3,10,000	34,47,750	18
2024	800	22,100	19,900	18,34,300	56,71,500	4,00,000	42,37,200	25

Impact of technological intervention

- Launched his own brand, “Vishwamitra Honey,” marketed through Manoj Madhu Utpadan Kendra, Rasen, Buxar.
- Obtained FSSAI License No. 20421041000003, ensuring quality assurance and strengthening consumer trust.
- Expanded enterprise operations, engaging 25–30 beekeepers as workers and generating rural employment.
- Processes approximately 20–25 tonnes of honey annually, with sales reaching up to Rs. 300 per kg.
- Developed strong market linkages across Bihar and adjoining districts of Uttar Pradesh.



Key Learnings and Way Forward

- Establishment of a honey processing unit and branded marketing significantly increased product demand and turnover.
- FSSAI quality certification enhanced brand credibility and facilitated enterprise expansion.
- The venture has become a source of steady employment and serves as a motivational model for aspiring rural entrepreneurs.
- Quality control certificate of FSSAI also supported this brand to maximize its popularity and establishment the enterprises.
- The venture serves as a replicable model for youth and small farmers seeking agri-based entrepreneurship opportunities.

The journey of Mr. Manoj Kumar illustrates how skill development, institutional support, and value addition can transform a small livelihood activity into a thriving rural enterprise. His beekeeping model not only enhanced household income but also generated substantial employment, contributing to local economic development. Today, he stands as a progressive beekeeper whose success is inspiring farmers across the region to diversify into sustainable and high-return agricultural enterprises.



Fig 8.4 Small Scale Honey processing plant

(Contribution: Deokaran, Ramkewal, Harigovind, Ravi Chaterjee, ICAR-RCER, KVK, Buxar)

8.5 EGG PRODUCTION (LAYER FARMING) BECAME A SOCIO-ECONOMIC GAME CHANGER: A SUCCESS STORY FROM BUXAR

Profile of the Farmer

Name: Mr. Jayprakash Singh, Age: 43 years Address: Mahadah, Block & District: Buxar, Bihar, Mob.: 7903719839, Education: Graduate, Farming Experience: 10 Years

Awards & Recognition, if any

- Awarded the best appreciation award by the Honorable Sri Tarkishore Prasad, Deputy Chief Minister of Bihar government.
- Awarded as a best innovative farmer's award by the Honorable Shri Srawan Kumar, Gramin Vikas and Social Welfare Minister of Bihar government.



Background and Situation Analysis

Mr. Jayprakash Singh, a young and enterprising farmer from Mahadah village located about five kilometers from Buxar city, was primarily engaged in traditional agriculture across approximately 6 hectares, cultivating cereals, pulses, and vegetables. He also maintained two milking buffaloes and occasionally provided farm machinery services using his tractor and implements. Despite these efforts, his income remained insufficient to meet daily household expenses due to reliance on the conventional rice–wheat cropping system and limited exposure to modern agricultural technologies. Seeking better livelihood opportunities, he explored diversified farming options that could provide stable and higher returns.

Institutional Support and Interventions

Mr. Singh approached Krishi Vigyan Kendra, Buxar for training on scientific poultry management, particularly commercial egg layer farming. After completing the training, specialists from KVK Buxar, along with experts from ICAR–Research Complex for Eastern Region Patna, conducted field visits and provided continuous technical guidance. KVK also

assisted him in applying for Bihar State Government schemes promoting egg layer farming. He was successfully selected and received 30% subsidy support, enabling him to establish a commercial poultry enterprise aimed at enhancing egg production and generating sustainable employment.

Enterprise Establishment and Technologies Adopted

With technical backstopping from KVK, Mr. Singh established a commercial egg layer unit on 0.4 hectares of his own land at Mahadah village. The well-planned infrastructure included:

- ✓ Brooder house: 180 ft × 36 ft
- ✓ Layer house: 230 ft × 36 ft
- ✓ Feed mill godown: 30 ft × 60 ft
- ✓ In-house feed mill for quality feed preparation
- ✓ Automatic feed distribution system to ensure uniform feeding and reduce labour costs
- ✓ Spray and sprinkler systems, foggers, and proper ventilation for temperature control
- ✓ Submersible pump and generator for uninterrupted operations
- ✓ Biological safety measures, regular vaccination, and scientific shed sanitation
- ✓ Tree plantation and boundary development to create a favourable microclimate
- ✓ Season-specific management practices—such as water spraying during extreme heat and covering sheds with jute bags in winter—helped minimize chick mortality and improve productivity.

Economic details of Interventions

The enterprise has an installed capacity of 15,000 birds, with 12,500 chicks successfully reared during 2025. Eggs are collected two to three times daily, which helps maintain quality and minimizes breakage. The farm achieved an impressive annual production of approximately 37,08,000 eggs, reflecting efficient management and scientific practices. The annual income of the entrepreneur showed a gradual increase ranging from Rs. 6,72,336 to 87,62,196 within five years with KVK support and due to the convergence with the Bihar government scheme

Impact and Achievements

- ✓ Diversified from traditional farming to a commercial, technology-driven poultry enterprise.
- ✓ Achieved substantial income growth and improved household economic security.
- ✓ Created rural employment and strengthened the local agricultural economy.
- ✓ Emerged as a progressive poultry farmer inspiring others to adopt scientific layer farming.

Key leaning and way forward

The journey of Mr. Jayprakash Singh illustrates how timely training, institutional support, and adoption of modern technologies can transform agriculture into a profitable enterprise. Layer farming not only enhanced his income but also generated employment and demonstrated the potential of poultry as a socio-economic driver for rural youth. His success stands as a motivating example for farmers seeking sustainable and high-return livelihood opportunities through enterprise diversification.

Table 8.5.1 : Production and economics before intervention (2020-21)

Before intervention				
Crop	Area (ha.)	Farmer practice	Yield (q/ha)	Net Income (Rs)/ year
Rice	3.0	Transplanting	46.0	2,84,280
Pigeonpea	0.2	Broadcasting		35,000
Wheat	1.2	Broadcasting	42.0	1,01,556
Lentil	0.4	Broadcasting	15.0	32,000
Chickpea	0.4	Broadcasting	15.5	37,000
Mustard	0.4	Broad casting	9.0	17,500
Tomato	0.4	Flat bed	130	1,20,000
Buffalo		2	450 ltr	45,000
Total	6.0	-	-	6,72,336

Table 8.5.2 : Production and economics after interventions (2024-25)

Kharif Season							
Sl. No.	Crop	Area (ha)	Intervention	Production (qt/ha)	Cost of cultivation	Gross Return	Net Return
					In Rupees/ hac		
1	Arhar	0.8	Raised Bed	13.2	20,000	99,660	79,660
2	Rice	3.0	Line transplanting				
	Total	3.8	–	–	–	–	–
Net Income (Kharif Season)							1,34,656
Rabi Season							
3	Wheat	3.00	Zero tillage	49.6	97,560	3,12,480	2,14,920
4	Chickpea	0.50	Zero tillage	20.4	20,630	1,02,000	81,370
5	Lentil	0.25	Zero tillage	19.4	18,250	97,000	78,750
6	Tomato	0.25	Raised bed	170	80,000	4,60,000	3,80,000
	Total	4.0	–	–	–	–	–
Net Income(Kharif Season)							755, 040

Egg production (Layer farming)					
Sl. No.	Name of the poultry	No of Birds	Egg production (No./year)	Gross Income (Rs.)	Net Income (Rs.)/ year
1	Poultry (Quiller) sonali	4000	-	9,60,000	4,80,000
2	Poultry (Sky lark) Egg layering	12,500	37,08,000	1,85,40,000	29,92,500
Net Income (layer farming)					38,72,500
Grand Total Rs (Kharif + Rabi + layer farming)				-	87,62,196



Fig 8.5 Recognition of Mr. Jayprakash Singh

(Contribution: Deokaran, Ramkewal, Harigovind and Ravi Chatterjee, ICAR-RCER, KVK, Buxar)

8.6 EMPOWERING TRIBAL LIVELIHOODS THROUGH SCIENCE-LED FARMING

Profile of the farmer

Name: Shri Dhane Munda, Village : Chhotkachumba, Panchayat: Majhlachumba, P.S. & Block : Mandu, District : Ramgarh (Jharkhand), Mobile Number: 9835549470, Age: 42 yrs. Education: 9th.

20 years of Farming Experiences.

Situation Analysis / Problem Statement

Mr. Munda, a hardworking tribal farmer with five acres of land under a predominantly rainfed farming system, practiced diversified agriculture by cultivating cereals, pulses, oilseeds, vegetables, and rearing livestock. However, due to acidic soils (pH 5.0–6.2), low organic carbon, low availability of nitrogen and phosphorus, emerging micronutrient deficiencies, low water-holding capacity, and erratic rainfall conditions prevalent in Ramgarh district, the farm could not generate the desired income despite the availability of basic irrigation facilities. The major constraints included poor access to quality seeds and planting materials, limited knowledge of improved crop varieties, and continued dependence on traditional practices. Inadequate scientific nursery management, imbalanced nutrient and water use, and insufficient pest and disease management further resulted in low productivity and higher cost of cultivation. Although the farm had significant potential, the lack of technical guidance and modern, resource-efficient technologies necessitated the introduction of scientific interventions and continuous advisory support to enhance productivity, profitability, and livelihood security.

Plan, Implementation and Support / Interventions

Krishi Vigyan Kendra, Ramgarh designed a need-based and farmer-centric intervention strategy to improve the productivity, profitability, and sustainability of Mr. Munda's farming system through adoption of scientific and climate-resilient practices.

Comprehensive training programmes and hands-on technical guidance were provided on improved high-yielding crop varieties, scientific nursery management, balanced nutrient application, soil and moisture conservation, and integrated pest and disease management. To ensure better crop establishment and yield enhancement, quality seeds and planting materials of recommended varieties were supplied under the Tribal Sub Plan (TSP).

Resource-efficient technologies such as plastic mulching for moisture conservation and weed management, and drip irrigation under PMKSY for efficient water use, were promoted to address soil and rainfed constraints. Continuous handholding support through regular agro-advisories, field visits, on-farm demonstrations, and group interactions—implemented in collaboration with ICAR–FSRCHPR, Ranchi—facilitated effective adoption and sustained improvement in farm performance.

Details of Practices Followed by the Farmer

- Adoption of improved and high-yielding crop varieties released by ICAR, State Agricultural Universities (SAUs), and the National Seeds Corporation (NSC).
- Scientific nursery raising, use of quality seedlings, and timely transplanting of vegetable crops to ensure better crop establishment and uniform growth.
- Crop diversification involving cereals, pulses, oilseeds, vegetables, fruits, along with integration of livestock enterprises for income stability and risk reduction.

- Use of plastic mulching in vegetable crops for effective moisture conservation, weed suppression, and improvement in soil temperature and crop yield.
- Adoption of drip irrigation under PMKSY to enhance water-use efficiency, ensure precise irrigation, and reduce water losses under rainfed conditions.
- Balanced application of FYM, chemical fertilizers, and micronutrients, along with judicious use of plant growth regulators, based on crop requirement and scientific recommendations.
- Implementation of soil and moisture conservation measures to sustain soil health and productivity under rainfed agro-ecosystems.
- Adoption of Integrated Pest and Disease Management (IPM/IDM) practices, including timely monitoring and need-based plant protection measures.
- Promotion of off-season vegetable cultivation to exploit market opportunities and realize higher remunerative prices.
- Regular interaction and consultation with KVK scientists, and timely adoption of agro-advisories and technical recommendations for improved decision-making and farm management.

Results/Output

As a result of the scientific interventions and continuous technical support provided by KVK, Ramgarh, Mr. Munda successfully transformed his traditional farming system into a profitable and sustainable enterprise. Adoption of improved crop varieties and scientific management practices led to a significant increase in productivity of cereals, pulses, oilseeds, and vegetables. Efficient use of inputs such as quality seeds, balanced nutrients, drip irrigation, and plastic mulching reduced the cost of cultivation and improved resource-use efficiency. Vegetable production emerged as the major income-generating component, supported by off-season cultivation and better market linkage. Integration of crop and livestock enterprises further stabilized farm income. Overall, the farmer's annual gross income increased to Rs. 5.40 lakhs with a net income of about Rs. 3.70 lakhs reflecting a substantial improvement in livelihood security. His success earned him recognition as a Progressive Farmer, inspiring other farmers in the region to adopt scientific and resource-efficient farming practices.

Lessons Learned and Future Plans

The experience of Mr. Munda clearly demonstrates that the adoption of scientific farming practices, use of quality seeds, and timely technical guidance play a crucial role in improving farm productivity, profitability, and livelihood security. Efficient water management through drip irrigation, use of plastic mulching, balanced nutrient application, and integrated pest and disease management helped reduce input costs and crop losses while significantly enhancing yields. Crop diversification combined with livestock integration ensured income stability and reduced production risks. Regular interaction with KVK scientists strengthened the farmer's decision-making ability and confidence in adopting new technologies.

Future Plans

- Expansion of area under improved varieties of cereals, pulses, oilseeds, and vegetables
- Extension of drip irrigation to the remaining cultivated area
- Adoption of advanced practices, including protected cultivation and off-season vegetable production

Table 8.6.1 : Impact of Technology / Intervention

Particulars	Before Intervention (Traditional Practices)	After Intervention (Scientific Practices)	Impact
Seed/Planting Material	Local / private seed of unknown quality	ICAR/SAU/NSC released quality seed	Higher germination and yield
Crop Varieties	Low-yielding local varieties	Improved high-yielding varieties	Increased productivity
Crop Management	Traditional practices	Scientific package of practices	Efficient resource use
Irrigation Method	Flood / conventional	Drip irrigation (PMKSY)	Water saving and higher efficiency
Mulching	Not adopted	Plastic mulch in vegetables	Reduced weeds and cost
Pest & Disease Management	Reactive / traditional	IPM & IDM practices	Reduced crop loss
Cost of Cultivation	High	Reduced through efficiency	Higher net returns
Cropping Intensity	Low	Increased with diversification	More production
Vegetable Production	Seasonal only	Off-season & seasonal	Better market price
Annual Gross Income (Rs.)	Low / Unstable	5,40,200	Significant increase
Annual Net Income (Rs.)	Limited	3,70,000	Improved profitability
Livelihood Security	Uncertain	Stable and sustainable	Enhanced resilience

Table 8.6.2 : Economic details of different enterprises.

Sl. No.	Crop / Enterprise	Area (Acre) / Nos.	Before		After		Major Improvements after Intervention
			Gross Income (Rs. /Year)	Net Income (Rs. /Year)	Gross Income (Rs. /Year)	Net Income (Rs. /Year)	
1	Cereals	1.20	25,000	18,000	35,700	27,300	Improved varieties, balanced nutrients, moisture conservation
2	Pulses	0.20	5,000	4,000	7,500	6,800	Quality seed, IPM and better crop management
3	Oilseeds	0.20	2,000	800	2,600	1,200	Improved varieties and nutrient management
4	Vegetables (seasonal & off-season)	2.10	1,80,000	1,10,000	4,52,000	3,02,000	Plastic mulching, drip irrigation, IPM, off-season production
5	Goatry	10 Nos.	25,000	18,000	40,000	31,000	Improved management, health care and feeding
6	Poultry	08 Nos.	1,500	1,000	2,400	1,700	Scientific rearing
Total	—	—	2,38,500	1,51,800	5,40,200	3,70,000	Integrated, diversified and climate-resilient farming system

- Increased use of organic and eco-friendly inputs for sustainable soil health
- Continued linkage with KVK Ramgarh for technical backstopping, capacity building, and market-oriented production

Conclusion (Key Insight)

The major driving force behind all these success stories is the convergence of science, institutions, and entrepreneurship.

☞ In simple terms:

These cases clearly demonstrate that income enhancement in agriculture is not due to a single intervention, but a systems approach combining technology, capacity building, market linkage, and institutional support.



Fig 8.6 Off-season vegetable cultivation through poly mulching with drip irrigation at Mandu, Ramgarh

(Contribution: Sudhanshu Shekhar, Indrajeet, Dharamjit Kherwar and Sunny Kumar, ICAR-RCER- KVK, Ramgarh)



Notes

A series of horizontal dashed lines for writing notes.



Notes

A series of horizontal dashed lines for writing notes.





भाकृ अनुष
ICAR



हर कदम, हर डगर
किसानों का हमसफ़र
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch



ISBN : 978-81-997322-9-2