



Khet Bachao Abhiyan (KBA) Test Before You Invest



भारतीय कृषि अनुसंधान परिषद
Indian Council of Agricultural Research
भाकृअनुप-महात्मा गाँधी समेकित कृषि अनुसंधान संस्थान
ICAR-MAHATMA GANDHI INTEGRATED FARMING RESEARCH INSTITUTE
Motihari, Bihar, India

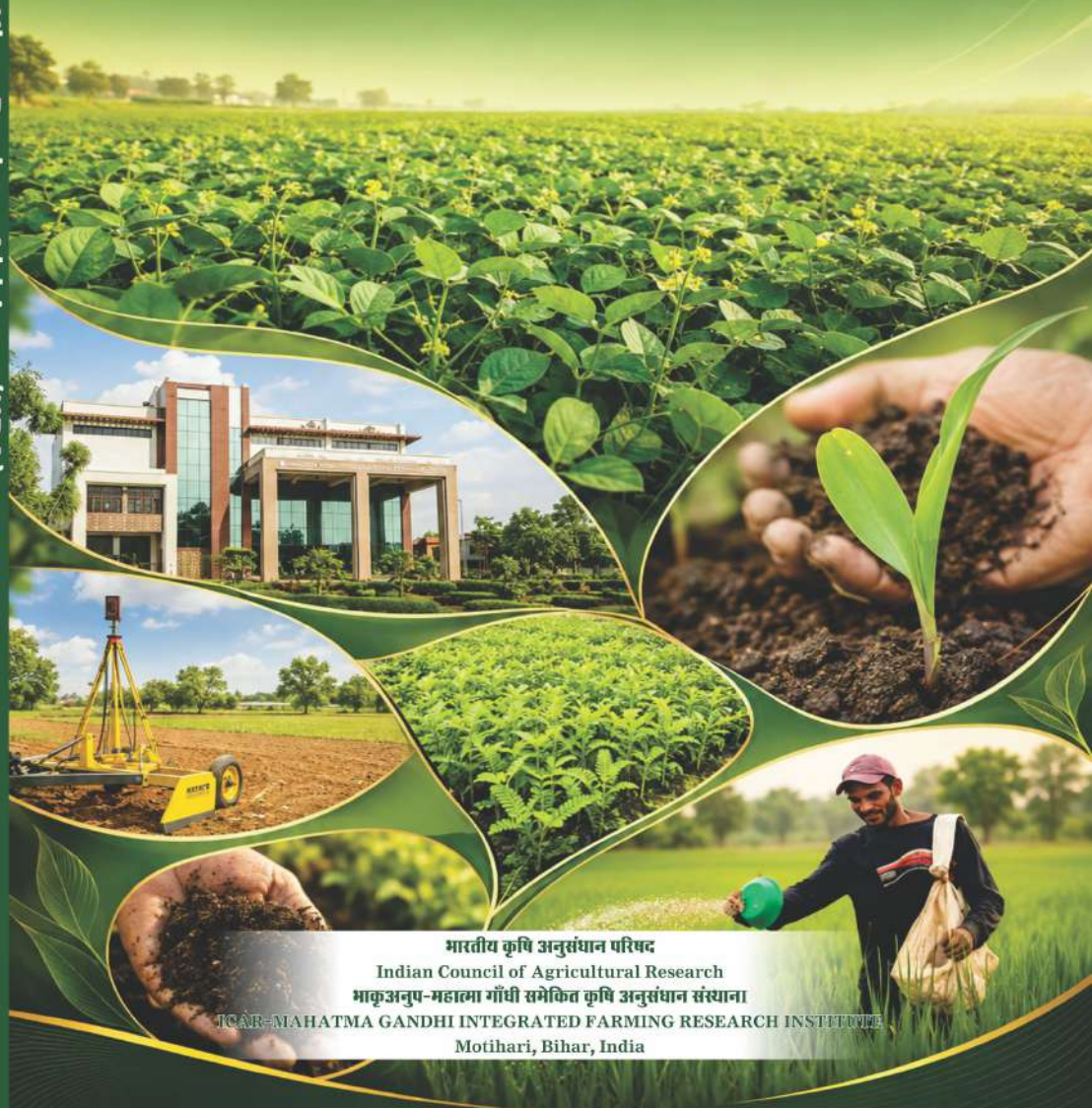
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A FIELD CHRONICLE

Khet Bachao Abhiyan (KBA) Test Before You Invest

The Khet Bachao Abhiyan Story from Bihar



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**ICAR–Mahatma Gandhi Integrated Farming
Research Institute (MGIFRI), Motihari**

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Dedicated to:

The hardworking farmers of Bihar whose commitment to nurturing healthy soils and adopting scientific farming practices continues to strengthen India's food and nutritional security.



PREFACE

Khet Bachao Abhiyan–2026



Healthy soils are the foundation of sustainable agriculture, environmental resilience, and national food security. They sustain crop productivity, regulate water and nutrient cycles, support biodiversity, and provide the ecological base upon which farming communities depend. However, in recent decades, increasing nutrient imbalances, declining soil organic carbon, residue mismanagement, and the growing impacts of climate change have emerged as major challenges to agricultural sustainability. Addressing these issues requires not only scientific innovations but also effective dissemination of knowledge to the farming community through participatory extension and institutional partnerships.

Recognizing these challenges, the Khet Bachao Abhiyan–2026 was launched by the Government of India and the Indian Council of Agricultural Research as a nationwide initiative to promote soil health, balanced nutrient management, climate-resilient agriculture, and sustainable farming practices. ICAR–MGIFRI, Motihari, led the campaign in close collaboration with the Department of Agriculture, Government of Bihar, Dr. Rajendra Prasad Central Agricultural University (RPCAU), Krishi Vigyan Kendras, Agricultural Technology Management Agency (ATMA), Panchayati Raj Institutions, Farmer Producer Organizations, and progressive farmers. Together, these institutions transformed scientific recommendations into practical field-level interventions through demonstrations, farmer meetings, village campaigns, exposure visits, capacity-building programmes, and intensive scientific advisories.

During the month-long campaign conducted from 1–30 June 2026, the institute reached 6,854 farmers across 49 villages in 19 blocks of East Champaran, West Champaran, Sheohar, and Patna districts. The campaign promoted a wide range of science-based interventions, including soil testing, balanced fertilization, integrated nutrient management, green manuring with Dhaincha, conservation agriculture, integrated farming systems, scientific orchard management, nature-based solutions, eco-friendly pest management, and climate-smart agricultural practices.

This booklet has been prepared to document that journey. Rather than presenting a chronological collection of reports, it reorganizes the campaign into thematic chapters that integrate scientific principles, field experiences, technical recommendations, farmer interactions, institutional collaborations, success stories, and impact assessments. Every chapter reflects the collective efforts of our scientists, extension personnel, collaborating institutions, and the farming communities

who actively participated in the campaign. It is our hope that this publication will serve not only as a record of achievements but also as a practical reference for researchers, students, extension professionals, policymakers, development agencies, and farmers interested in promoting sustainable and climate-resilient agriculture.

I sincerely acknowledge the guidance and encouragement received from the Indian Council of Agricultural Research, particularly the Director General, ICAR & Secretary, DARE, and the Deputy Director General (Natural Resource Management). I also express my gratitude to the Department of Agriculture, Government of Bihar, RPCAU, Krishi Vigyan Kendras, ATMA, Panchayati Raj Institutions, Farmer Producer Organizations, and all partner organizations for their unwavering support. My appreciation extends to every scientist, technical staff member, field functionary, Young Professional, and student whose dedication ensured the successful implementation of the campaign. Above all, I offer my heartfelt thanks to the farmers of Bihar, whose enthusiasm, openness to innovation, and commitment to sustainable farming made this initiative truly meaningful.

I congratulate the editors and contributors for compiling this comprehensive volume. I am confident that the experiences, technologies, and lessons presented in this book will inspire similar science-led initiatives across the country and contribute to the national vision of healthy soils, resilient farming systems, prosperous farmers, and sustainable agricultural development.

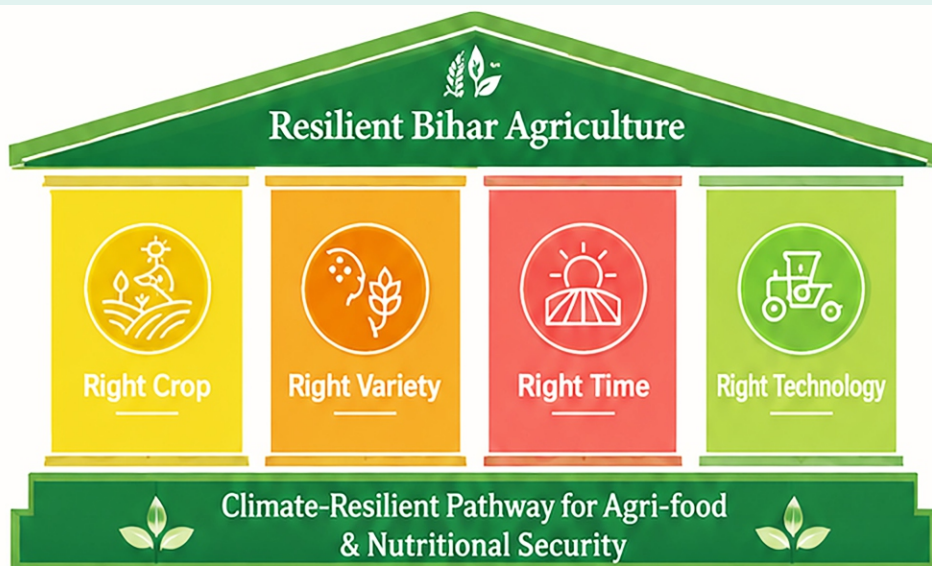
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ACKNOWLEDGEMENTS

The successful implementation of Khet Bachao Abhiyan–2026 in Bihar and the preparation of this publication represent the collective efforts, dedication, and collaboration of numerous institutions and individuals committed to promoting soil health, sustainable agriculture, and farmers' prosperity. We take this opportunity to express our sincere gratitude to all those who contributed directly and indirectly to this important initiative.

We are profoundly grateful to the Indian Council of Agricultural Research (ICAR), New Delhi, for conceptualizing and spearheading the nationwide Khet Bachao Abhiyan, which has reinforced the importance of soil health as the foundation of sustainable agricultural development. We sincerely acknowledge the visionary leadership and continuous encouragement of the Director General, ICAR & Secretary, DARE, and the Deputy Director General (Natural Resource Management), ICAR, whose guidance has strengthened the Institute's commitment towards science-led extension and natural resource conservation.

We express our heartfelt gratitude to Shri Radha Mohan Singh, Hon'ble Member of Parliament, Purvi Champaran and Former Union Minister of Agriculture & Farmers' Welfare, for his constant encouragement towards promoting sustainable agriculture and strengthening the linkage between agricultural research and farming communities.

The editors gratefully acknowledge the invaluable support and leadership of Dr. Raghavendra Singh, Director, ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR–MGIFRI), Motihari, whose vision, motivation, and unwavering encouragement made the successful implementation of the campaign and the publication of this book possible. His emphasis on integrating scientific research with effective extension has greatly inspired the Institute's efforts to reach farmers with practical, science-based solutions.

We sincerely appreciate the active collaboration extended by the Department of Agriculture, Government of Bihar, Dr. Rajendra Prasad Central Agricultural University (RPCAU), Pusa, Agricultural Technology Management Agency (ATMA), Krishi Vigyan Kendras (KVKs), Farmer FIRST Programme, Scheduled Caste Sub Plan (SCSP), Farmer Producer Organizations (FPOs), Panchayati Raj Institutions, and district- and block-level agricultural officials. Their coordinated efforts greatly enhanced the outreach and impact of the campaign across East Champaran, West Champaran, Sheohar, and Patna districts.

We record our deep appreciation for the dedicated efforts of the scientists, technical officers, research associates, Young Professionals, technical staff, supporting personnel, and administrative staff of ICAR–MGIFRI and collaborating institutions. Their commitment in organizing farmer meetings, conducting demonstrations, preparing scientific advisories, documenting field activities, collecting farmer feedback, generating extension literature, and coordinating field programmes ensured the successful execution of the campaign.

We express our deepest gratitude to the farmers of Bihar, whose enthusiasm, participation, willingness to learn, and openness to adopting scientific agricultural practices formed the true foundation of the Khet Bachao Abhiyan. Their invaluable experiences, traditional knowledge, feedback, and confidence in science continue to inspire our research and extension programmes. This publication is dedicated to their unwavering commitment towards conserving soil health, improving farm productivity, and building resilient farming systems for future generations.

We hope that this book will serve as a lasting record of the collective efforts undertaken under Khet Bachao Abhiyan–2026 and will encourage researchers, extension professionals, students, policymakers, development agencies, and farming communities across the country to work together towards the shared goal of healthy soils, prosperous farmers, and sustainable agriculture.

Editors



ABOUT KHET BACHAO ABHIYAN (KBA)



Agriculture has long been the backbone of India's economy and the primary source of livelihood for millions of farming families. However, the sustainability of agricultural production is increasingly challenged by declining soil fertility, imbalanced nutrient use, and depletion of soil organic carbon, residue mismanagement, emerging nutrient deficiencies, climate variability, and the overexploitation of natural resources. These challenges not only threaten crop productivity and profitability but also undermine the long-term resilience of farming systems and national food security. Recognizing the urgent need to restore soil health and promote sustainable agricultural practices, the Government of India, through the Indian Council of Agricultural Research (ICAR), launched the **Khet Bachao Abhiyan** (KBA-Save the Farm Campaign) as a nationwide farmer awareness and technology dissemination initiative.

The campaign is founded on a simple yet powerful principle: healthy soils are the foundation of prosperous farmers and sustainable agriculture. It aims to bridge the gap between scientific research and on-farm practices by taking evidence-based technologies directly to farmers through village-level interactions, demonstrations, field schools, capacity-building programmes, and collaborative extension activities. Rather than focusing solely on increasing crop yields, the campaign emphasizes

the restoration of soil health, efficient use of natural resources, climate resilience, and sustainable livelihood enhancement.

The primary objectives of the KBA are to promote soil testing and soil-health-based nutrient management, encourage balanced and integrated fertilizer use, improve soil organic carbon through crop residue management and green manuring, strengthen integrated farming systems, enhance water-use efficiency, promote climate-resilient agricultural practices, and increase farmers' awareness of scientific crop production technologies. The campaign also advocates the adoption of integrated nutrient management, conservation agriculture, biological inputs, nature-based solutions, orchard nutrition management, eco-friendly pest management, crop diversification, and efficient resource recycling to improve productivity while safeguarding environmental quality.

The campaign was implemented by the ICAR-MGIFRI, Motihari, in close collaboration with the Department of Agriculture, (DoA), Government of Bihar (GoB), RPCAU, KVKs, ATMA, FPOs, and progressive farmers. This collaborative framework enabled scientific knowledge to reach farming communities effectively through coordinated field-level activities and participatory learning approaches.

During June 2026, the campaign covered 49 villages across 19 blocks in the districts of East

Champan, West Champan, Sheohar, and Patna, reaching 6,854 farmers through a series of awareness programmes, farmer-scientist-input dealers interactions, demonstrations, exposure visits, training programmes, field diagnostics, and technical advisories. Major thematic areas included soil testing and the **"Test Before You Invest"** campaign, balanced fertilization, integrated nutrient management (INM), green manuring using Dhaincha, conservation agriculture, integrated farming systems, scientific orchard management, summer mungbean cultivation, natural farming, climate-smart agriculture, and eco-friendly pest and disease management. The campaign also promoted institutional convergence by actively engaging local governance institutions, extension agencies, farmer organizations, and rural youth to strengthen technology dissemination and community participation.

This documents the scientific foundation, implementation strategy, field experiences, technological interventions, institutional collaborations, farmer success stories, and key lessons emerging from the KBA-2026 in Bihar. More than a compilation of outreach activities, it presents a science-led model of agricultural extension that integrates research, innovation, and participatory learning to address contemporary challenges in agriculture. It is hoped that the experiences and best practices presented in this volume will serve as a valuable reference for researchers, extension professionals, students, policymakers, development agencies, and farming communities, while also providing a replicable framework for promoting healthy soils, climate-resilient agriculture, and sustainable farming systems across India.



ABOUT ICAR–MGIFRI



The ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR–MGIFRI), Motihari, Bihar, is one of the premier research institutes of the Indian Council of Agricultural Research (ICAR) dedicated to developing and promoting integrated, climate-resilient, and sustainable farming systems for improving farmers' livelihoods and ensuring long-term agricultural sustainability. Situated in the historic land of Champaran, associated with Mahatma Gandhi's first Satyagraha movement, the Institute carries forward the philosophy of self-reliance, sustainability, and inclusive rural development through science-led agricultural innovations.

The Institute serves as a national centre of excellence for Integrated Farming Systems (IFS) research, with a mandate to *“develop location-specific, resource-efficient, economically viable, and environmentally sustainable farming models for diverse agro-ecological regions”* of the country. Its multidisciplinary research integrates crops, horticulture, livestock, fisheries, agroforestry, soil and water management, agricultural engineering, natural resource management, agricultural economics, and extension sciences to optimize resource use,

enhance system productivity, improve profitability, and strengthen climate resilience.

ICAR–MGIFRI focuses on generating scientific evidence and practical technologies that address emerging challenges such as declining soil fertility, climate variability, water scarcity, degradation of natural resources, biodiversity loss, and increasing production costs. The Institute has developed and demonstrated innovative approaches in conservation agriculture, soil health management, integrated nutrient management, precision farming, resource recycling, organic and natural farming, crop diversification, protected cultivation, integrated pest management, renewable energy applications, and climate-smart agricultural practices. Special emphasis is placed on improving resource-use efficiency, enhancing soil organic carbon, strengthening circular bioeconomy approaches, and promoting sustainable intensification of farming systems.

Research at the Institute is supported by laboratories, experimental farms, integrated farming system models, weather monitoring facilities, demonstration units, and advanced field research infrastructure. Through experiments,

adaptive research, farmer participatory trials, and technology validation programmes, ICAR–MGIFRI continuously develops solutions that are scientifically robust, economically feasible, and readily adoptable by farming communities. The Institute also plays an important role in capacity building through training programmes, skill development initiatives, student internships, farmer exposure visits, and collaborative research with national and international organizations.

Extension and technology dissemination constitute one of the core strengths of ICAR–MGIFRI. Working in close collaboration with ICAR institutes, KVKs, State Departments of Agriculture, ATMA, RPCAU, FPOs, and other development agencies, the Institute promotes the large-scale adoption of scientific technologies through demonstrations, field schools, village campaigns, farmer-scientist interactions, digital extension platforms, and participatory learning approaches.

The KBA–2026 is a significant example of the Institute's commitment to translating scientific research into meaningful field-level impact. Through coordinated outreach activities across Bihar, ICAR–MGIFRI successfully mobilized scientists, extension professionals, local

institutions, and farmers to promote soil testing, balanced nutrient management, green manuring, integrated farming systems (IFS), scientific orchard management, climate-resilient agriculture, and resource conservation technologies. The campaign demonstrated how research, extension, and community participation can work together to improve soil health and strengthen sustainable agricultural development.

As agriculture continues to face the challenges of climate change, resource degradation, and increasing demand for food, nutrition, and livelihood security, *ICAR–MGIFRI remains committed to developing innovative, science-based, and farmer-centric solutions that support resilient farming systems and sustainable rural development.* Through interdisciplinary research, strategic partnerships, and effective extension, the Institute continues to contribute to the national vision of healthy soils, prosperous farmers, resilient farming systems, and sustainable agriculture for a developed India.

**Science for Sustainable Farming
Innovation for Farmers
Integrated Solutions for Resilient Agriculture**



Green manuring demonstration plots.

EXECUTIVE SUMMARY



Healthy summer mungbean (Vigna radiata L.) crop grown under recommended agronomic practices. Inclusion of mungbean in cropping systems enhances biological nitrogen fixation, improves soil organic matter, breaks pest and disease cycles, and contributes to sustainable intensification and higher system productivity.

Agriculture is the cornerstone of India's food, nutritional, and livelihood security, with soil serving as the fundamental resource that sustains agricultural productivity and ecosystem health. However, over the past several decades, Indian agriculture has witnessed a gradual decline in soil quality due to imbalanced fertilizer use, depletion of soil organic carbon, continuous nutrient mining, residue burning, declining biological activity, and the increasing impacts of climate variability. These challenges have reduced nutrient-use efficiency, increased production costs, and threatened the long-term sustainability of farming systems. Recognizing the urgent need to restore soil health and promote sustainable agricultural practices, the Government of India, through the Indian Council of Agricultural Research (ICAR), launched the nationwide Khet Bachao Abhiyan (Save the Farm Campaign) to create awareness among farmers about scientific soil management and climate-resilient agriculture.

The campaign was built around the simple yet powerful message "Test Before You Invest", emphasizing that scientific soil testing should guide fertilizer application rather than generalized recommendations or traditional practices. The campaign further promoted balanced nutrient management, integrated nutrient management, green manuring, conservation agriculture, integrated farming systems, efficient water management, natural resource conservation, and climate-smart agricultural technologies to improve productivity while conserving natural resources.

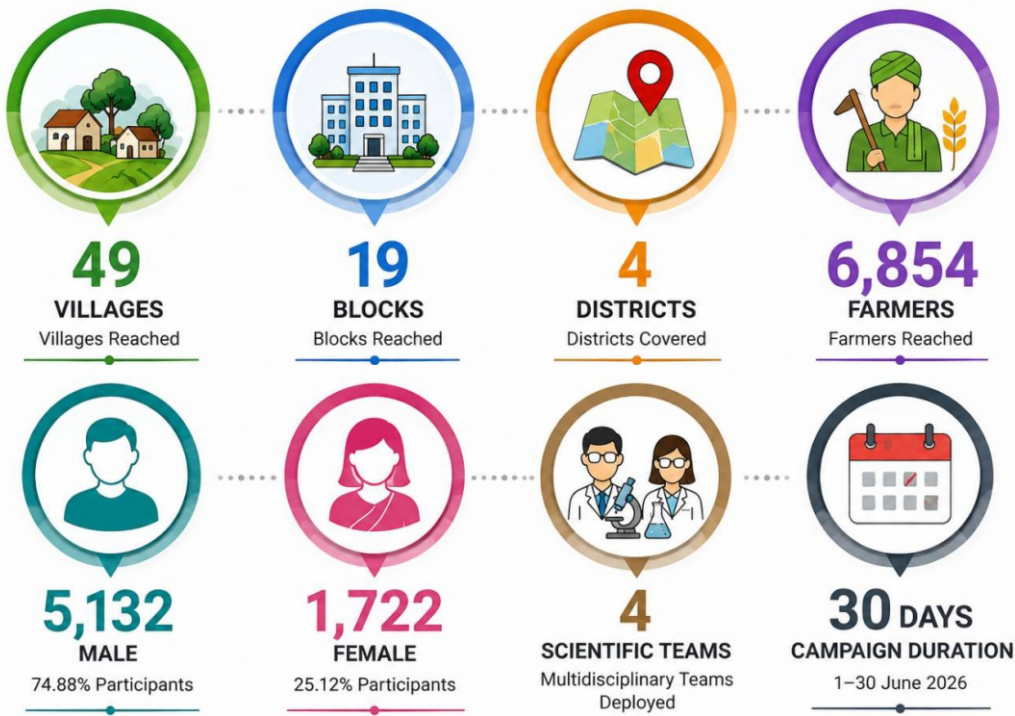
As part of this national initiative, ICAR–MGIFRI, Motihari, implemented the KBA-2026 across selected districts of Bihar during 1–30 June 2026. The campaign was executed through close collaboration with the Department of Agriculture, Government of Bihar, RPCAU, KVKs, ATMA, FPOs, Panchayati Raj Institutions, and progressive farmers. This collaborative institutional framework enabled scientific recommendations

to reach farmers through demonstrations, awareness programmes, village meetings, field visits, exposure programmes, farmer-scientist interactions, and hands-on technical training.

During the month-long campaign, the Institute successfully covered 49 villages across 19 blocks in the districts of East Champaran, West Champaran, Sheohar, and Patna, directly reaching 6,854 farmers, including a substantial participation of women farmers and rural youth. More than 144 field demonstrations, numerous farmer meetings, technical sessions, exposure visits, and village-level awareness programmes were organized to demonstrate science-based technologies under real farming conditions. The campaign served as a platform for direct interaction between scientists and farmers, allowing location-specific agricultural problems to

be discussed and practical solutions to be provided immediately.

The campaign focused on several key thematic areas that collectively contribute to sustainable agricultural development. *Soil testing and soil-health-based nutrient management formed the cornerstone of all activities, encouraging farmers to adopt balanced fertilizer application based on scientific soil analysis.* Integrated nutrient management strategies combining inorganic fertilizers with farmyard manure, compost, vermicompost, biofertilizers, and microbial inoculants were promoted to improve nutrient-use efficiency and enhance soil biological activity. Particular emphasis was placed on correcting secondary and micronutrient deficiencies, especially sulphur, zinc, and boron, which have become increasingly important for sustaining crop productivity in Bihar.



Recognizing the importance of restoring soil organic matter, the campaign actively promoted green manuring with Dhaincha (*Sesbania* spp.), crop residue incorporation, organic recycling, and biological nitrogen fixation. Farmers were made aware of the multiple benefits of green manuring, including improvement in soil structure, increased

microbial activity, enhanced water-holding capacity, nutrient recycling, and reduction in chemical fertilizer requirements. Scientific demonstrations illustrated how these practices contribute to long-term soil fertility while reducing production costs and improving environmental sustainability.

Another major component of the campaign was the promotion of Integrated Farming Systems (IFS) as a resilient and profitable approach for small and marginal farmers. Scientists demonstrated integrated crop-livestock-horticulture-fisheries models that optimize resource utilization, recycle farm wastes, diversify farm income, and enhance nutritional security. Field visits to Farmer FIRST Programme villages and successful IFS models enabled farmers to observe practical examples of sustainable farming under local conditions. The campaign also highlighted the importance of integrating fruit crops, livestock enterprises, fisheries, and value-added activities to increase farm resilience against climatic and market uncertainties.

The campaign further addressed climate-resilient agriculture through the promotion of conservation agriculture, crop diversification, nature-based solutions, scientific orchard management, eco-friendly pest management, efficient water management, and improved crop establishment techniques. Farmers received scientific advisories on rice nursery management, summer mungbean cultivation, mango and litchi nutrient management, papaya production, integrated pest management, and balanced fertilizer application. These advisories were supported by field demonstrations and interactive discussions that encouraged farmers to adopt environmentally sound agricultural practices. One of the distinguishing features of the KBA was its strong emphasis on institutional convergence and participatory extension. Scientists worked closely with district agriculture officials, KVKs, ATMA personnel, Panchayati Raj representatives, Farmer Producer Organizations, fertilizer dealers, rural youth, women farmers, and progressive farmers to strengthen technology dissemination and community participation. Capacity-building programmes were organized not only for farmers but also for extension personnel and input dealers, thereby creating a wider network for promoting scientific agriculture. The active involvement of Gram Panchayats, Farmer FIRST villages, SCSP beneficiaries, educational

institutions, and local organizations significantly expanded the outreach and effectiveness of the campaign.



This publication presents a comprehensive documentation of the campaign by organizing its diverse activities into thematic chapters rather than chronological reports. It integrates scientific concepts with field experiences, institutional collaborations, farmer success stories, technical recommendations, case studies, and impact assessments. The documents highlight how multidisciplinary research can be effectively translated into farmer-friendly extension programmes through coordinated institutional efforts. It also demonstrates the value of integrating soil science, agronomy, horticulture, livestock, fisheries, agricultural engineering, meteorology, entomology, and extension education in addressing the complex challenges of modern agriculture.

The experiences documented in this volume clearly indicate that restoring soil health requires much more than recommending fertilizers. *Sustainable agricultural transformation depends on understanding local farming systems, strengthening farmer-scientist interactions, encouraging community participation, improving knowledge dissemination, and integrating scientific innovations with traditional wisdom.* The campaign reinforced that healthy soils are central to achieving higher productivity, improved profitability, enhanced climate resilience, efficient resource use, and long-term environmental sustainability.

It is expected that this publication will serve as a valuable reference for researchers, extension professionals, policymakers, students, development agencies, and farming communities across India. Beyond documenting the achievements of KBA–2026, it presents a practical framework for implementing science-led agricultural extension programmes that integrate soil health, natural resource management,

climate resilience, and integrated farming systems. The lessons, technologies, and experiences presented in this book may be adapted and replicated in other agro-ecological regions to strengthen sustainable agricultural development and contribute to the national vision of healthy soils, prosperous farmers, resilient farming systems, and a developed India.



Dr. Vijay Singh Meena, Senior Scientist (Soil Science) and Nodal Officer, Khet Bachao Abhiyan, welcoming Panchayat leaders, farmers, and stakeholders during the Mukhiya Sammelan. He outlined the vision and objectives of the month-long Khet Bachao Abhiyan, emphasizing soil health restoration through the "Test Before You Invest" campaign, soil test-based nutrient management, balanced fertilizer use following the 4R principles, green manuring, integrated farming systems, crop diversification, residue management, and climate-resilient agriculture. He also presented the implementation strategy, collaborative framework involving ICAR–MGIFRI, Krishi Vigyan Kendras (KVKs), the Department of Agriculture, Government of Bihar, ATMA, RPCAU, Panchayati Raj Institutions, Farmer Producer Organizations (FPOs), and progressive farmers, along with the campaign's outreach targets and village-level demonstration plan across the identified districts of Bihar



INTRODUCTION: WHY SOIL HEALTH MATTERS



Dhaincha cultivated as a green manure crop under Khet Bachao Abhiyan. The inset shows healthy root nodules formed by Rhizobium bacteria, which naturally fix atmospheric nitrogen and improve soil fertility before incorporation into the soil.

India's agricultural growth over the past decades has depended heavily on chemical fertilizers. But that same dependence has produced a quieter cost: declining soil organic carbon, emerging micronutrient deficiencies, and nutrient imbalances that raise cultivation costs even as yields plateau. Khet Bachao Abhiyan-2026 was built around a single corrective idea — that soil testing, not habit or advertising, should govern every fertilizer decision a farmer makes.

ICAR-Mahatma Gandhi Integrated Farming Research Institute (MGIFRI), Motihari, is mandated to develop and disseminate integrated farming system (IFS) models and soil-health-centered technologies suited to the flood-prone, waterlogged agro-ecologies of North Bihar. It was this institutional mandate — combining soil science, farm mechanization, animal nutrition, fisheries, and plant protection expertise under

one roof — that shaped the institute's approach to the campaign: not a one-time awareness drive, but a sustained, multidisciplinary outreach carried by four scientific teams into farmers' fields for the entire month of June.

The Central Message: Test Before You Invest

Across nearly every village-level programme organized under the campaign, scientists returned to the same opening point: soil testing should be the first step before a farmer purchases fertilizer or any other agricultural input. Informed, soil-test-based nutrient management, scientists explained, improves productivity, reduces input costs, and safeguards long-term soil health — while indiscriminate application does the opposite, quietly degrading the very asset it is meant to protect.

At Village Siswah and at the closing programmes of the month, the message was distilled into two campaign taglines that farmers heard repeated across the district: "Test Before You Invest" and "Small Acts, Big Impact: Test Soil Before You Invest."



Interactive discussion with Panchayat representatives on the scientific use of biofertilizers and sustainable crop residue management as key components of soil health restoration. Participants deliberated on residue incorporation, composting, microbial inoculants, nutrient recycling, and the integration of organic and inorganic nutrient sources to improve soil organic carbon, biological activity, and long-term agricultural sustainability under the Khet Bachao Abhiyan..

An Institute Built for This Mandate

ICAR-MGIFRI's location in Motihari places it at the heart of a distinctive agro-ecology— the waterlogged, flood-prone plains of East and West Champaran, Sheohar and neighbouring districts — where conventional cereal-centric advice often falls short. The institute's scientists therefore paired the campaign's soil-testing message with location-specific solutions: Integrated Farming Systems (IFS) combining crops, fisheries, livestock

and horticulture; drainage and land-shaping advice for waterlogged fields; and crop calendars adapted to erratic monsoon timing.

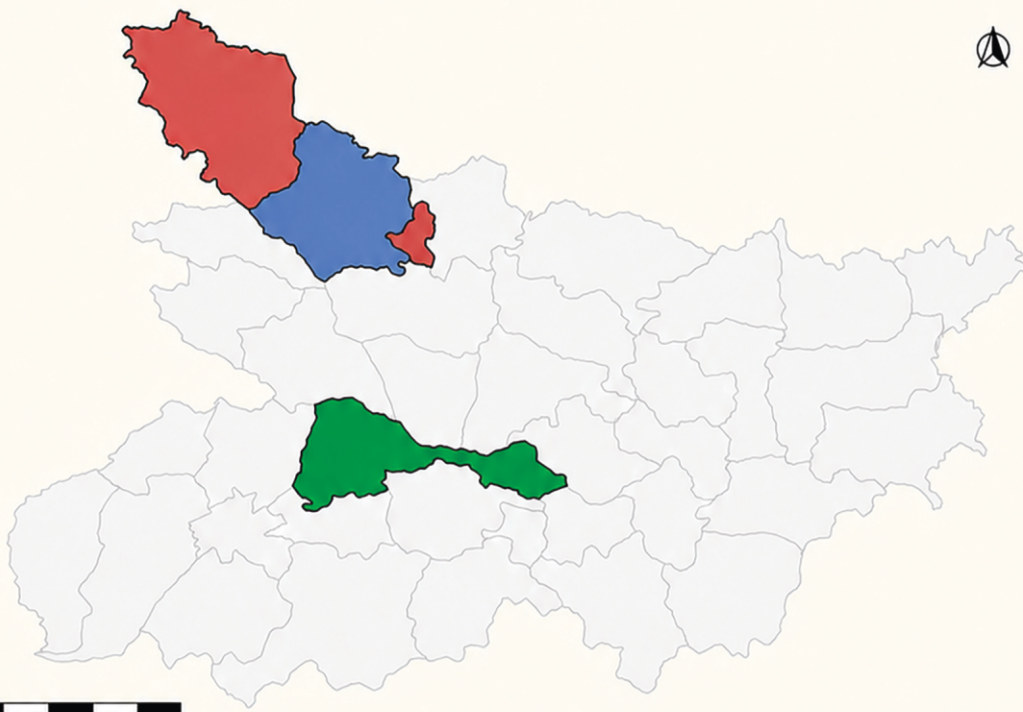
This combination— a national campaign mandate, delivered through an institute whose core expertise is built for exactly this landscape — is what gives the Khet Bachao Abhiyan-2026 story from Bihar its particular character, and is the thread that runs through every chapter of this book.



Farmers actively interacting with scientists during the Madhopur Kisan Chaupal under Khet Bachao Abhiyan, discussing soil health management, balanced nutrient use, climate-resilient agricultural practices, and location-specific solutions for sustainable farming.



CAMPAIGN ARCHITECTURE



Geographic location of the four target districts (East Champaran, West Champaran, Sheohar, and Patna) in Bihar, India, where Khet Bachao Abhiyan (KBA)–2026 was implemented by ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR–MGIFRI), Motihari, in collaboration with state departments and partner institutions.

Khet Bachao Abhiyan-2026 in Bihar was not a single event but a month-long, multi-team operation. This chapter sets out how the campaign was organized, who led it, and which partner institutions made its scale possible — context that frames every field-level chapter that follows.

Leadership and Coordination

The campaign was carried out under the overall guidance of Dr. Raghavendra Singh, Director, ICAR–MGIFRI, and coordinated by Dr. Vijay Singh Meena, Senior Scientist (Soil Science), who served as the Nodal Officer of the campaign. The activities were implemented through four multidisciplinary scientific teams, each combining expertise in soil science, farm mechanization, plant protection, animal nutrition and fisheries.



Partner Network

The institute worked in close collaboration with the Department of Agriculture, Government of Bihar; the Agricultural Technology Management Agency (ATMA); Krishi Vigyan Kendras at Piprakothi,

Madhopur, Parsauni and Sheohar; Dr. Rajendra Prasad Central Agricultural University (RPCAU), Pusa; ICAR–Indian Agricultural Research Institute (IARI) Regional Station, Pusa, Samastipur; ICAR–ATARI, Patna; Panchayati Raj representatives (Mukhiyas); and Farmer Producer Organizations (FPOs) — demonstrating, in the words of the institute's own campaign reporting, "a strong convergence between research, extension, and state agencies."

Reach: Districts, Blocks and Villages

Over 1–30 June 2026, the campaign covered four districts — East Champaran, West Champaran, Sheohar, and Patna — reaching 19 development blocks and 47 villages through farmer trainings, Kisan Gosthis, Kisan Chaupals, Mukhiya Sammelans, exposure visits, field demonstrations,

FPO–scientist interactions, input-dealer interactions, orchard management programmes, and Integrated Farming System demonstrations.

Modes of Outreach

The campaign deliberately used a mix of formats to reach different audiences: Kisan Chaupals and Kisan Gosthis for village-level farmer training; a Mukhiya Sammelan to engage Panchayat leadership directly; certification training for fertilizer dealers, recognising their role as everyday knowledge partners to farmers; an FPO–Scientist–Progressive Farmer Interface Workshop; farmer exposure visits to model IFS sites; and a live telecast of the national PM-KISAN installment release for farmers unable to travel. This variety of formats is reflected in the chapters that follow.



Maize crop residue burning: an unsustainable practice that depletes soil organic matter, increases greenhouse gas emissions, and diminishes long-term soil fertility. Khet Bachao Abhiyan promotes residue recycling, composting, and in-situ incorporation as sustainable alternatives.





BIHAR-WIDE AGRICULTURAL AND SOIL-HEALTH CONTEXT



Community rice nursery promoted under Khet Bachao Abhiyan as a climate-smart contingency measure for ensuring timely availability of healthy rice seedlings during delayed monsoon, El Niño events, and other adverse weather conditions, thereby supporting timely transplanting, reducing production risks, and enhancing the resilience of rice-based farming systems.

Bihar's agriculture is supported by extensive alluvial plains, intensive cultivation and a large population of small and marginal farmers. These conditions have enabled high cropping intensity and substantial production of rice, wheat, maize, pulses, oilseeds, vegetables, fruits and fodder. At the same time, repeated crop harvests remove large quantities of nutrients from the soil. Where nutrient removal is not matched by balanced replenishment, the productive capacity of the soil can decline even when short-term crop yields remain apparently satisfactory.

The emerging challenge is therefore not only the total amount of fertilizer used, but the balance among nitrogen, phosphorus, potassium, sulphur, micronutrients and organic sources. Fertilizer practices are often dominated by a small number of readily available products, while crop residues, farmyard manure, compost, green manure and

biofertilizers are used inconsistently. This can produce a situation in which one nutrient is applied beyond crop requirement while another is progressively depleted. Declining soil organic carbon, residue burning, continuous cereal cultivation and limited recycling of farm biomass can further weaken soil structure, biological activity, water retention and nutrient-use efficiency.

These changes are usually gradual. A field may continue to produce for several seasons while its nutrient reserves and biological functions are being reduced. The effects become visible later through yield stagnation, weak crop response to fertilizer, increasing production costs, nutrient-deficiency symptoms, greater sensitivity to drought or waterlogging and a need for progressively larger

corrective inputs. Soil degradation is thus both an ecological and an economic concern.

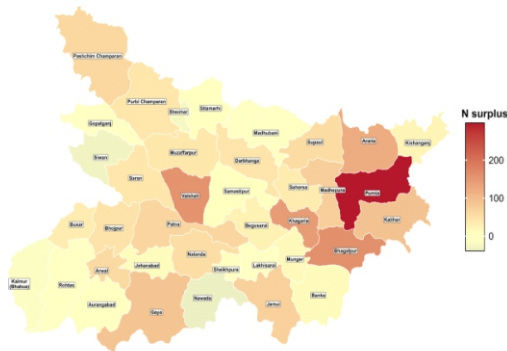


Fig. 1.1: District-level nitrogen surplus across Bihar, calculated as actual N consumption/sale (2023-24) minus projected N requirement (kg N ha⁻¹).

KBA- 2026 was developed within this wider context. Its message, **'Test Before You Invest'**, places diagnosis before input purchase. Soil testing is intended to identify which nutrients are deficient, adequate or excessive; crop and yield requirements are then considered before deciding the source, rate, time and method of application. The campaign therefore treats soil testing as the entry point to balanced nutrient management rather than as an isolated laboratory activity.

Interpretation of the maps

These are district-level contextual maps. They indicate broad spatial patterns and should not be used as direct fertilizer prescriptions for individual farms. Field-level decisions still require representative soil sampling, crop information, management history and local interpretation.

The district-level maps included in this section provide a Bihar-wide visual context for the campaign. Fig. 1.1 shows nitrogen surplus calculated as district-wise actual nitrogen consumption/sale in 2023-24 minus the projected nitrogen requirement derived from the district-level General Fertilizer Recommendation framework. Positive values therefore indicate reported nitrogen consumption above the projected requirement, whereas negative values indicate reported consumption below that benchmark. The marked variation among districts

demonstrates that Bihar cannot be represented by a single fertilizer-use condition.

Fig. 1.2 presents a derived Potassium Mining Risk Index (KMRI) based on the shortfall of actual potassium consumption/sale relative to projected K₂O requirement. The index is scaled from 0 to 1, with values approaching 1 indicating a larger proportional potassium deficit and therefore a stronger risk of continued potassium mining if the prevailing imbalance persists.

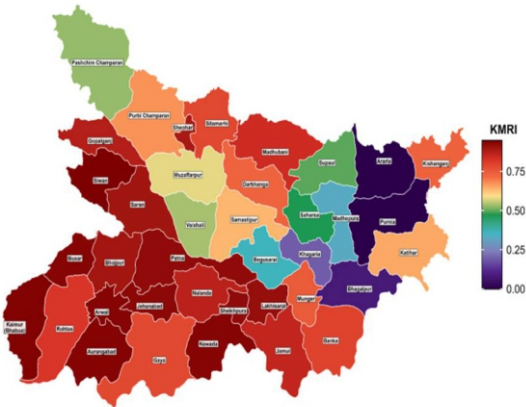


Fig. 1.2: Potassium Mining Risk Index (KMRI) across Bihar, derived from the proportional shortfall of actual K₂O consumption/sale relative to projected K₂O requirement.

Read together, figures show why fertilizer management must focus on nutrient balance rather than on the quantity of a single input. A district may record nitrogen consumption above its projected requirement while simultaneously recording potassium consumption far below its projected requirement. Additional nitrogen cannot correct potassium under-supply. This coexistence of nitrogen surplus and potassium deficit provides the scientific justification for soil-test-based, crop-specific and location-sensitive recommendations.



The study districts span contrasting parts of Bihar but share several soil-management concerns. Purbi Champaran, Paschim Champaran and Sheohar are located in the northern alluvial plains, where monsoon rainfall, flood exposure, seasonal waterlogging, drainage limitations and variable timing of field operations strongly influence crop establishment and nutrient-use efficiency. Patna provides a contrasting central Bihar setting and extended the campaign beyond the north-Bihar field environment through exposure and demonstration activities.



The alluvial soils of the study area are agriculturally productive, but inherent fertility does not guarantee a balanced nutrient supply under intensive cultivation. Repeated harvest of grain, straw, fodder, fruits and vegetables removes nutrients from the field. Where the replacement strategy is concentrated mainly on nitrogenous fertilizer, other nutrients may become limiting and native soil reserves may be depleted. The Bihar-wide patterns shown in figures (maps) provide the broader background against which these district-level activities were undertaken.



Water management is particularly important in the northern study districts. Saturated soil can restrict root growth and aeration, alter nutrient transformations, delay sowing and reduce the efficiency of applied fertilizer. Conversely, periods of inadequate rainfall or delayed monsoon onset can create moisture stress and disrupt crop calendars. For this reason, the campaign linked soil testing and balanced fertilization with drainage, field

bunding, land levelling, timely crop establishment, crop-duration planning and efficient water use.



The study districts also contain predominantly smallholder farming systems in which crops, livestock, horticulture, fisheries and household resource use are closely connected. Recommendations were therefore framed at the farming-system level. Crop residues can be used as livestock feed or composting material; livestock manure can be returned to fields; ponds can support fish production and irrigation; green-manure crops can add biomass and biologically fixed nitrogen; and horticultural or livestock enterprises can reduce dependence on a single seasonal crop. The campaign addressed five connected management concerns across the study districts.

1. Need for representative soil sampling and correct interpretation of soil-test reports. Soil testing was promoted as the basis for identifying nutrient deficiencies and avoiding unnecessary expenditure on nutrients that were already sufficient.
2. Farmers were encouraged to move beyond nitrogen-centered fertilizer decisions and consider phosphorus, potassium, Sulphur, micronutrients, organic manures and biological sources. ***The 4R principles-right source, right rate, right time and right method-were used to translate soil-test results into practical field decisions.***



3. Declining organic matter and limited biomass return. Dhaincha, summer mungbean, green gram, Azolla, crop-residue recycling, farmyard

manure, compost and vermicompost were promoted as components of integrated nutrient management. These inputs contribute not only nutrients but also carbon, microbial activity, aggregation and improved water-holding capacity.

4. Interaction between soil health and water management. Advice on fertilizer use was combined with scientific drainage, land shaping, laser land levelling, zero tillage, direct-seeded rice and timely crop establishment. This approach recognized that

nutrient recommendations cannot perform effectively where roots are constrained by waterlogging, soil compaction or poorly timed operations.

5. Integrated Farming Systems involving crops, livestock, fisheries and horticulture were demonstrated as a means of recycling resources, diversifying income and reducing climatic and market risk. This was especially relevant where flood-prone or low-lying land limited the reliability of a single crop-based strategy.





TEST BEFORE YOU INVEST: SOIL TESTING AND BALANCED NUTRITION



If one idea anchored the entire campaign, it was this: fertilizer decisions should follow the soil test report, not habit. This chapter draws together the events most directly built around that message— from the very first Kisan Chaupal of the campaign at Madhopur to a dedicated certification course for fertilizer dealers and a hands-on soil-sampling demonstration at the campaign's close.

Kisan Chaupal at KVK Madhopur, West Champaran: ICAR-MGIFRI, in collaboration with Krishi Vigyan Kendra (KVK), Madhopur, organized a "Kisan Chaupal" and awareness-cum-training programme on soil health and balanced fertilizer use for farmers from different villages of West Champaran district, coordinated by KVK Madhopur through extensive local outreach and farmer mobilization.

Dr. Vijay Singh Meena, Senior Scientist (Soil Science), stressed the need for judicious fertilizer use and emphasized that fertilizer dealers and farmers must work together to achieve the

campaign's objectives, highlighting that balanced fertilization guided by soil testing is essential for maintaining soil fertility and improving nutrient-use efficiency. Dr. Subham Mukherjee reinforced the "Test Before You Invest" theme, explaining how soil-test-based nutrient management can reduce unnecessary expenditure while enhancing crop performance.

Dr. Saurabh Dubey highlighted the role of biofertilizers and eco-friendly nutrient management in reducing dependence on chemical fertilizers, while Er. Vikas Paradkar emphasized laser land levelling and efficient water management under the principle of "Khet ka Pani Khet Mein". Dr. Chelpuri Ramulu sensitized farmers about the adverse effects of crop residue burning and demonstrated sustainable residue management aligned with natural farming.

The programme also promoted the "4Rs of Nutrient Stewardship" — Right Source, Right Rate, Right Time, and Right Method of fertilizer application — encouraging farmers to combine

chemical fertilizers with biofertilizers, organic manures, green manuring and crop residue recycling.

A total of 52 participants — 45 male and 7 female farmers — along with officials from ATMA, ATMs and BTMs, took part in the programme.



Dr. Vijay Singh Meena, Senior Scientist (Soil Science), interacting with farmers during the Kisan Chaupal on soil health restoration, soil testing, balanced fertilizer application, and the 4R Principles of Nutrient Stewardship (Right Source, Right Rate, Right Time, and Right Place) to improve nutrient-use efficiency, crop productivity, and environmental sustainability under the Khet Bachao Abhiyan.

Balanced Fertilizer Use and Crop Planning, Banjaria Block: ICAR-MGIFRI, with the Department of Agriculture, Government of Bihar, organized a Farmer Training-cum-Kisan Gosthi at Banjaria Block, East Champaran, attended by 59 farmers (41 male, 18 female). Dr. Koushik Banerjee emphasized biofertilizers, biopesticides, organic manures and IFS approaches for restoring soil health, stressing that "healthy food originates from healthy soils."

Dr. Vijay Singh Meena used a memorable analogy to explain soil organic matter: he asked farmers whether a crop could grow well in a brick made by crushing fertile topsoil. Farmers unanimously agreed it could not — and Dr. Meena linked this directly to residue burning, explaining that burning destroys the same organic carbon and nutrients that removing topsoil for brick-making does.



Dr. Koushik Banerjee delivering a technical lecture to farmers on soil health management, balanced fertilizer use, and climate-smart agricultural practices during the Kisan Gosthi at Banjaria Block under the Khet Bachao Abhiyan.

A special session covered crop calendars for rice-based systems: rice transplanted up to 10 July can use long-duration varieties (145–150 days); transplanting from late July to early August should be matched with medium-duration varieties (125–135 days); and delayed transplanting in mid-August calls for short-duration varieties (90–120 days) to avoid delaying succeeding wheat and maize.

Certification Course for Fertilizer Dealers, KVK Piprakothi: Recognising that fertilizer dealers are often farmers' first point of advice, ICAR-MGIFRI and KVK Piprakothi organized a training-cum-awareness programme for 30 trainees of the Certification Course on Integrated Nutrient

Management for Fertilizer Dealers.

Dr. S. K. Singh emphasized that dealers serve as important knowledge partners in guiding farmers toward soil-test-based nutrient management. Dr. Arpita Nalia explained the role of Dhaincha, green gram and Azolla as biological nitrogen sources, noting that a well-grown Dhaincha crop can contribute approximately 50–60 kg nitrogen per hectare— equivalent to nearly 110–130 kg urea (about 2.5–3 bags). Dr. A. K. Singh, Senior Scientist & Head, KVK Piprakothi, highlighted vermicomposting as an eco-friendly nutrient source, and trainees were advised to promote regular soil testing and recommended fertilizer doses to farmers.



Fertilizer dealers attend the Integrated Nutrient Management certification course, KVK Piprakothi.



Dr. Shailesh Kumar Singh, Principal Scientist (Agronomy) and Co-Nodal Officer, Khet Bachao Abhiyan, delivering a technical session to certified fertilizer dealers on soil test-based nutrient recommendations. The training emphasized interpretation of soil test reports, balanced fertilizer application based on crop and soil requirements, adoption of the 4R Nutrient Stewardship principles (Right Source, Right Rate, Right Time, and Right Place), integrated nutrient management, and the responsible role of fertilizer dealers in promoting scientific, efficient, and environmentally sustainable fertilizer use among farmers.



*Dr. Vijay Singh Meena, Senior Scientist (Soil Science), demonstrating healthy root nodules of Dhaincha (*Sesbania aculeata*) and mungbean (*Vigna radiata*) to fertilizer dealers during a capacity-building programme under the Khet Bachao Abhiyan. The demonstration highlighted the role of symbiotic *Rhizobium* bacteria in biological nitrogen fixation, illustrating how legume crops naturally enrich soil nitrogen, improve soil fertility, enhance soil organic matter, and reduce dependence on synthetic nitrogen fertilizers. The session emphasized the importance of integrating green manuring and pulse crops into cropping systems for sustainable nutrient management and climate-resilient agriculture..*

Healthy Soil, Healthy Food, Piprakothi Block: At a Farmer Training-cum-Kisan Gosthi at Piprakothi Block attended by 48 farmers, Dr. Lamella Ojha, Animal Nutritionist, drew out a connection scientists returned to more than once during the campaign: that the quality of animal feed depends on soil health, so that healthy soils produce nutritious crops and fodder, which in turn support

healthier livestock and, ultimately, better human nutrition.

Dr. Vijay Singh Meena repeated the topsoil-brick analogy used earlier in the campaign, this time linking it explicitly to both brick-making and erosion as parallel processes that strip away decades of accumulated organic carbon and nutrients.



Dr. Lamella Ojha discussing the soil–plant–livestock–human health continuum under the Khet Bachao Abhiyan. The session emphasized that healthy soils produce nutrient-rich fodder, which supports improved animal nutrition, livestock productivity, and food quality, thereby strengthening sustainable integrated farming systems and nutritional security.



Farmers attending the Kisan Gosthi at Piprakothi, where Dr. Vijay Singh Meena, Dr. Koushik Banerjee, and Dr. Lamella Ojha provided technical guidance on the objectives of the Khet Bachao Abhiyan, soil health restoration, soil test-based nutrient management, climate-resilient agriculture, integrated farming systems, and sustainable natural resource management.



Demonstration of mung bean crop



Interactive discussion with farmers on scientific dragon fruit cultivation, emphasizing well-drained soils, balanced nutrition based on soil testing, organic matter enrichment, efficient irrigation, and integrated nutrient management for sustainable, climate-resilient fruit production under the Khet Bachao Abhiyan.



Technical session on crop planning for maize-based farming systems at Piprakothi under the Khet Bachao Abhiyan. The programme was attended by Block Technology Managers (BTMs), Assistant Technology Managers (ATMs), and progressive farmers, and focused on the selection of high-yielding and climate-resilient maize varieties, timely sowing, soil test-based nutrient management, balanced fertilizer application following the 4R Nutrient Stewardship principles, integrated nutrient management, water-efficient cultivation practices, and integrated pest and disease management. Participants were also trained on developing location-specific crop plans to enhance productivity, profitability, and resilience under changing climatic conditions..

ICAR-MGIFRI and ATMA, Mehshi Block: A joint ICAR-MGIFRI-ATMA training-cum-awareness programme at Mehshi Block, East Champaran, drew 79 farmers. Dr. S. K. Singh highlighted the objectives of the campaign, while Dr. Lamella Ojha again explained the soil-crop-livestock-human

health continuum. The session also covered crop-calendar-based varietal selection and the risks of a weak or uncertain monsoon associated with El Niño-like conditions, advising greater attention to pulses, oilseeds and Shri Anna (millets) under moisture-stressed conditions.



Dr. Shailesh Kumar Singh, Principal Scientist (Agronomy) and Co-Nodal Officer, Khet Bachao Abhiyan, conducting a farmer training programme at Mehshi Block on balanced fertilizer use, soil health management, climate-resilient agriculture, and sustainable crop production. The session emphasized scientific nutrient management, efficient resource use, and climate-smart farming practices for enhancing productivity and resilience.



Scientists from ICAR–MGIFRI and ATMA interacting with farmers during the Kisan Gosthi at Mehshi under the Khet Bachao Abhiyan. The interactive session focused on soil health restoration, the "Test Before You Invest" campaign, soil test-based nutrient management, balanced fertilizer use following the 4R Nutrient Stewardship principles, green manuring, crop residue recycling, integrated farming systems, and climate-resilient agricultural practices. Farmers actively discussed field-specific production constraints and received location-specific scientific recommendations for improving productivity, profitability, and long-term soil sustainability.

Rice Nursery Management and Soil Health, Siswah Village: ICAR-MGIFRI and ATMA organized a farmer awareness programme at Siswah village, Banjaria Block, attended by 49 farmers (37 male, 12 female), led by Dr. Subham Mukherjee and Dr. N. B. Patil. Dr. Mukherjee advised farmers to adopt

balanced fertilization of nitrogen, phosphorus, potassium, sulphur and micronutrients according to soil-test recommendations rather than blanket applications, and explained the role of nitrogen-fixing, phosphorus-solubilizing and potassium-mobilizing biofertilizers.



Dr. Subham Mukherjee conducting a farmer awareness programme at Siswah Village under the Khet Bachao Abhiyan, highlighting the importance of soil health, soil test-based nutrient management, and scientific rice nursery practices for producing healthy seedlings and ensuring climate-resilient rice cultivation.

Special emphasis was placed on rice nursery management — healthy seed selection, seed treatment, optimum seed rate, proper drainage and nursery hygiene — while Dr. Patil discussed

eco-friendly pest and disease management through neem-based formulations, biological control agents and integrated pest management (IPM).



Dr. N. B. Patil, Senior Scientist (Agricultural Entomology), demonstrating scientific rice nursery management practices to farmers at Siswah Village under the Khet Bachao Abhiyan. The session emphasized the production of healthy seedlings, timely nursery management, integrated pest management, and climate-resilient rice cultivation.



*Dr. Vijay Singh Meena, Senior Scientist (Soil Science), demonstrating healthy root nodules of Dhaincha (*Sesbania aculeata*) and mungbean (*Vigna radiata*) to fertilizer dealers during a capacity-building event under the Khet Bachao Abhiyan. The demonstration emphasized representative soil sampling techniques for accurate soil testing, soil health assessment, and soil test-based nutrient management to improve fertilizer-use efficiency and sustainable crop production.*

Soil Testing and Summer Mungbean, East Champaran: Closing the soil-testing thread of the campaign, ICAR-MGIFRI organized a farmer awareness-cum-training programme under the tagline "Small Acts, Big Impact: Test Soil Before You Invest." Dr. Raghavendra Singh, Director, highlighted the importance of soil-test-based nutrient management and legume inclusion such as mungbean for improving soil fertility and nutrient-use efficiency.

Dr. Vijay Singh Meena conducted a practical

hands-on session on soil sampling, demonstrating scientific methods of soil sample collection, processing, labelling and submission to testing laboratories, and sensitized farmers about the importance of accurate soil test reports. He also demonstrated mungbean root nodulation, and farmers enthusiastically referred to the nodules as a "natural urea factory in the field."

The programme was attended by 46 participants, including 15 male farmers and 31 female farmers/Jeevika Didis.



Earthworms play a vital role in maintaining healthy soils by improving soil structure, aeration, water infiltration, and nutrient cycling. Their activity accelerates the decomposition of organic matter, enhances microbial activity, and contributes to the formation of fertile, biologically active soils, making them valuable indicators of soil health.





GREEN MANURING AND BIOLOGICAL NITROGEN



The Mukhiya Sammelan brought together Panchayat leaders, farmers, and scientists to discuss strategies for improving soil health through natural farming, balanced nutrient management, green manuring, resource recycling, and integrated farming systems. The programme emphasized community participation and local governance in promoting climate-resilient and sustainable agricultural development under the Khet Bachao Abhiyan.

No single technology recurred through the campaign as often as Dhaincha (*Sesbania*) green manuring. Scientists carried a consistent, quotable figure into nearly every village: a well-grown Dhaincha crop can biologically fix approximately 50–60 kg nitrogen per hectare — equivalent to nearly 110–130 kg urea per hectare, or about 2.5–3 bags of urea. This chapter traces how that single technical fact was built into a campaign-wide movement toward reducing chemical nitrogen use.

Mukhiya Sammelan: Engaging Panchayat Leaders, West Champaran: ICAR - MGIFRI organized a "Mukhiya Sammelan"—an awareness- cum-training programme on green manuring, soil health management and balanced fertilizer use — for Panchayat representatives and farmers from different blocks of West Champaran

district, under the theme "Healthy Soil, Prosperous Farmers: Green Manuring for Sustainable Agriculture."

Dr. Vijay Singh Meena delivered a detailed presentation on green manuring, legumes and crop diversification, and highlighted the potential of Dhaincha for rice-based systems of Bihar, explaining that it simultaneously improves soil organic matter, microbial activity and soil structure. A live field demonstration showcased *Sesbania* plants, root nodules and their biological nitrogen - fixing capacity, alongside demonstrations on earthworm activity and soil biological health.

Chairing the session, Dr. S. K. Purbey, Principal Scientist, called on Panchayat representatives to play an active role in creating awareness about soil testing, balanced fertilization, crop residue

management and sustainable farming, stressing that public participation is essential for the campaign's success.

Thirty-seven participants attended, actively sharing village-level strategies for strengthening soil health awareness across West Champaran district.



Dr. S. K. Purbey, Principal Scientist (Fruit Science), chairing the technical session during the Mukhiya Sammellan and interacting with Mukhiyas and Panchayat representatives on the importance of green manuring and legume-based soil restoration under the Khet Bachao Abhiyan. The discussion highlighted the role of Dhaincha, sunn hemp, and pulse crops in biological nitrogen fixation, soil organic matter enrichment, nutrient recycling, and improving soil fertility. Participants were encouraged to promote these sustainable practices at the village level through Panchayati Raj Institutions to strengthen climate-resilient and resource-efficient agriculture.



A live field demonstration of Dhaincha (*Sesbania aculeata*) root nodules conducted under the Khet Bachao Abhiyan, illustrating the process of biological nitrogen fixation by symbiotic Rhizobium bacteria. Farmers observed how healthy root nodules naturally convert atmospheric nitrogen into plant-available forms, contributing approximately 40–100 kg N ha⁻¹, enriching soil organic matter, stimulating beneficial microbial activity, improving soil structure, and reducing dependence on synthetic nitrogen fertilizers. The demonstration emphasized green manuring as a cost-effective and climate-smart strategy for restoring soil fertility and sustaining crop productivity.

Nature-Based Solutions, East Champaran: A Kisan Chaupal in East Champaran district brought together 39 participants around nature-based, resource-efficient solutions for climate-resilient agriculture. Dr. Subham Mukherjee emphasized soil-test-based nutrient management and integrating chemical fertilizers with organic manures, green manuring, biofertilizers, Azolla and crop residue recycling.

Dr. N. B. Patil demonstrated the use of *Trichoderma* as a biological agent for seed treatment, seedling root dip and soil application to suppress soil-borne diseases, and explained the

preparation of Dashparni Ark — a traditional botanical formulation prepared from the leaves of ten locally available plants including neem, karanj, castor, dhatura, papaya, guava and pomegranate — as a pesticide-reducing alternative.

Er. Vikas Paradkar covered mechanization-based solutions including laser land levelling, precision seeding, zero-tillage seed drills and Happy Seeder technology, while cautioning against repeated, indiscriminate rotavator use, which can cause soil pulverization and shallow hardpan formation.



Dr. Subham Mukherjee, Scientist (Soil Science), delivering a technical session in East Champaran under the Khet Bachao Abhiyan on nature-based nutrient management. The programme highlighted the integration of farmyard manure, compost, vermicompost, green manuring, crop residue recycling, biofertilizers, and biological nitrogen fixation with soil test-based balanced fertilizer application. The session emphasized improving soil organic matter, enhancing soil biological activity, increasing nutrient-use efficiency, restoring soil health, and promoting climate-resilient agricultural production through sustainable nutrient management practices.



*Dr. N. B. Patil demonstrating *Trichoderma*-based biological seed treatment to farmers, emphasizing its role in suppressing soil-borne diseases, enhancing root growth, stimulating beneficial microbial activity, and improving crop establishment. The practice was promoted as an integral component of integrated disease management, sustainable soil health, and climate-resilient agriculture under the Khet Bachao Abhiyan.*



Scientist conducting a live demonstration on the preparation of Dashparni....., conducting a live demonstration on the preparation of Dashparni Ark during the Khet Bachao Abhiyan. Farmers were trained in the preparation of this indigenous botanical formulation using leaves of ten medicinal and pesticidal plant species, fermented with cow urine and other natural ingredients to produce an eco-friendly plant protection solution. The experts explained its role in repelling insect pests, suppressing disease incidence, enhancing ecological balance, protecting beneficial organisms, and minimizing pesticide residues in agricultural ecosystems. The demonstration emphasized the integration of Dashparni Ark with soil health management, natural farming, and Integrated Pest Management (IPM) as a sustainable approach for climate-resilient and environmentally safe crop production.



Er. Vikas Paradkar, Scientist (Farm Machinery and Power Engineering), explaining climate-smart and resource-efficient farm mechanization technologies to farmers during the Khet Bachao Abhiyan. The demonstration focused on the Laser Land Leveler (LLL) for achieving uniform field leveling, improving irrigation efficiency, and reducing water losses; the Happy Seeder for direct seeding into standing crop residues, thereby eliminating residue burning and conserving soil organic carbon; and the Zero-Till Seed Drill for minimum soil disturbance, timely sowing, reduced fuel consumption, and improved soil moisture conservation. The session emphasized mechanization as a key component of conservation agriculture for enhancing resource-use efficiency, reducing greenhouse gas emissions, improving soil health, and promoting climate-resilient and sustainable farming systems.

Green Manuring and input distribution Momentum, Dipua Village, Piprakothi Block:

At a Farmers–Scientist Interaction and Awareness-cum-Training Programme at Dipua village, farmers were advised to include Dhaincha, green gram and Azolla as biological nitrogen sources for partial replacement of chemical fertilizers in rice cultivation. A field visit to standing maize fields allowed scientists to give in-situ advisories on

balanced fertilizer and biofertilizer application. Dr. Koushik Banerjee emphasized that including at least one pulse crop in the annual cropping cycle can significantly improve soil fertility through biological nitrogen fixation, while Dr. Lamella Ojha stressed soil testing before fertilizer application. Vegetable seeds were distributed among the 35 participating farmers to encourage household nutrition and diversified farming.



During a field visit at Dipua Village, scientists demonstrated the benefits of green manuring as a sustainable practice for restoring soil fertility and improving soil health. Dr. Koushik Banerjee explained the role of green manures in enhancing climate resilience and conserving soil moisture, while Dr. Lamella Ojha highlighted the importance of nutrition-sensitive agriculture through household kitchen gardens linked with integrated farming systems. In collaboration with the Block Technology Managers (BTMs), vegetable seed kits were distributed to farmers to encourage year-round cultivation of nutrient-rich vegetables for household consumption and income generation. The programme emphasized the complementary role of green manuring, diversified cropping, kitchen gardening, and integrated farming systems in improving soil health, nutritional security, and climate resilience under the Khet Bachao Abhiyan.



Dr. Koushik Banerjee discusses pulse-based crop diversification with farmers. Dr. Koushik Banerjee explaining the role of pulse-based crop diversification as a climate-smart strategy for sustainable agricultural intensification. The discussion highlighted the benefits of incorporating legumes into existing cropping systems to naturally enrich soil nitrogen through biological nitrogen fixation, improve soil physical, chemical, and biological properties, increase soil organic carbon, enhance nutrient-use efficiency, and reduce dependence on synthetic nitrogen fertilizers. The session also covered climate-resilient crop planning, selection of suitable pulse varieties, efficient resource management, and diversification as key approaches for improving farm income, nutritional security, and long-term agricultural sustainability under the Khet Bachao Abhiyan.



Dr. Lamella Ojha, Scientist (Animal Nutrition), leading an interactive farmer–scientist discussion at Dipua Village on the adoption of green manuring under the Khet Bachao Abhiyan. The session emphasized the integration of Dhaincha and other leguminous green manure crops for improving soil organic matter, biological nitrogen fixation, nutrient recycling, and long-term soil fertility. Dr. Koushik Banerjee, Scientist (Agricultural Meteorology), complemented the discussion by highlighting the role of green manuring in enhancing soil moisture conservation, improving climate resilience, and promoting sustainable crop production under

changing weather conditions. Farmers actively shared their field experiences and discussed practical approaches for integrating green manuring into local cropping systems.

Dhaincha-Based Soil Health Revolution, Mehsi–Chakia–Piprakothi Blocks:

In a hands-on training and exposure visit for farmers from Mehsi, Chakia and Piprakothi Blocks, ICAR-MGIFRI showcased its own Dhaincha green manuring plots, IFS models, vermicomposting units and resource recycling technologies. Forty-nine farmers, including 18 male and 31 female participants, attended. Dr. Amol K. Jadhav explained the scientific and economic basis of Dhaincha green manuring in detail: for a rice crop receiving a recommended fertilizer dose of 120:60:40 kg NPK per hectare, Dhaincha can supply nearly 25–40 percent of the nitrogen

requirement. Farmers observed standing Dhaincha plots and learned that the crop should be incorporated into the soil 40–45 days after sowing to convert its green biomass into organic carbon and nutrients. Dr. S. K. Purbey noted that declining soil organic carbon and excessive chemical dependence are emerging challenges for Bihar's agricultural sustainability, and that future farming systems must restore soil biological health through green manuring, diversification and integrated nutrient management. The programme closed with the message that "healthy soils are the foundation of profitable farming."



*During the exposure visit to ICAR–MGIFRI's Dhaincha demonstration plots, farmers observed the growth performance, biomass accumulation, and root nodulation of *Sesbania aculeata*. Scientists explained the scientific basis of green manuring, highlighting that incorporation of Dhaincha before flowering contributes substantial organic biomass and biologically fixed nitrogen to the soil, improves soil organic carbon, enhances microbial activity and nutrient availability, suppresses weeds, and strengthens the resilience of cropping systems. The demonstration reinforced the importance of green manuring as a cost-effective, environmentally sustainable, and climate-smart technology for restoring soil health under the Khet Bachao Abhiyan.*



Dr. Amol K. Jadhav discussing the economic feasibility of Dhaincha green manuring with farmers at ICAR–MGIFRI. The session emphasized that incorporating Dhaincha before flowering generates substantial biomass and biologically fixed nitrogen, thereby reducing fertilizer expenditure, improving soil organic carbon, increasing nutrient recycling and microbial activity, and enhancing the productivity of subsequent crops. Farmers were encouraged to view green manuring not as an additional expense but as a long-term investment in soil health that lowers production costs, improves resource-use efficiency, strengthens climate resilience, and enhances farm profitability.



Technical session on soil-test-based nutrient management, Banjarja. Dr. Vijay Sing Meena delivering a technical session on soil test-based nutrient management at Banjarja under the Khet Bachao Abhiyan, emphasizing balanced fertilizer application, the 4R principles of nutrient stewardship, and sustainable soil health management for improving crop productivity and nutrient-use efficiency.





INTEGRATED FARMING SYSTEMS (IFS) FOR FLOOD-PRONE BIHAR



For the waterlogged, flood-prone plains of North Bihar, single-crop advisories are rarely sufficient. This chapter follows the campaign's Integrated Farming Systems (IFS) thread — combining crops, fisheries, livestock and horticulture — including its convergence with ICAR's Farmer FIRST Programme, and the resource-conserving technologies (laser levelling, zero tillage, drainage management) needed to make such systems work in this landscape.

Climate-Smart Farming for Waterlogged Areas, Village Siswah: ICAR-MGIFRI organized an awareness-cum-training programme at Village Siswah, Banjaria Block, focused on resource-efficient, soil-health-centered practices for waterlogged, flood-prone and soil-degraded areas, attended by 42 participants. Dr. Subham

Mukherjee emphasized soil-test-based fertilizer application over indiscriminate use, and discussed the benefits of conservation agriculture — zero tillage and direct-seeded rice — for reducing costs, saving water and ensuring timely crop establishment.

Er. Vikas Paradkar, Scientist (Farm Power and Machinery), explained the adverse effects of repeated rotavator use, which can cause soil pulverization, shallow hardpan formation and deterioration of soil structure, and recommended occasional deep tillage to break compacted layers. Given local waterlogging and flooding challenges, he advised farmers to strengthen field bunds, adopt proper land levelling, and use scientific land shaping and drainage management to improve crop productivity.



Dr. Subham Mukherjee explaining the principles and benefits of conservation agriculture to farmers at Siswah Village during the Khet Bachao Abhiyan. The session highlighted conservation agriculture as an integrated approach combining minimum soil disturbance through zero tillage, continuous soil cover using crop residues or cover crops, and diversified cropping systems. Farmers learned how these practices improve soil structure, increase soil organic matter, enhance microbial biodiversity, improve water infiltration and moisture conservation, reduce production costs and greenhouse gas emissions, and contribute to long-term soil health, climate resilience, and sustainable agricultural productivity.



Farmers attending a technical session on climate-smart agriculture at Siswah Village during the Khet Bachao Abhiyan. Scientists highlighted integrated approaches for adapting to climate change through conservation agriculture, soil health restoration, crop diversification, biological nitrogen fixation, efficient irrigation and drainage management, integrated nutrient management, residue recycling, and the adoption of weather-informed agricultural practices. The programme encouraged farmers to integrate scientific innovations with local knowledge to improve productivity, profitability, and long-term sustainability of farming systems.



Er. Vikas Paradkar demonstrating climate-resilient tillage and drainage management technologies for waterlogged agroecosystems during the Khet Bachao Abhiyan. The technical session emphasized precision land leveling, efficient surface drainage, zero-till seed drills, ridge-furrow planting, residue retention, and conservation agriculture-based mechanization to improve water management, reduce soil compaction, enhance root development, facilitate timely crop establishment, and increase resource-use efficiency. Farmers learned how scientific land preparation and drainage management can reduce production risks, improve soil health, and enhance the productivity and sustainability of waterlogging-prone farming systems.



Scientists interacting with farmers during a field demonstration on precision land levelling and integrated water management at Banjaria Block. The discussion emphasized the role of Laser Land Levelers (LLL) in achieving uniform field gradients, reducing irrigation water losses, improving fertilizer-use efficiency, facilitating timely crop establishment, and minimizing the adverse effects of waterlogging and drought. Farmers also learned about scientific drainage planning, in-situ moisture conservation, conservation agriculture-based land preparation, and efficient water-use strategies to enhance soil health, crop productivity, and resilience to climatic variability under the Khet Bachao Abhiyan.

Farmer FIRST Programme: Balbhadarpur, Ujhilpur, Narha & Hasanpur Villages, Tetaria Block : As part of both Khet Bachao Abhiyan and the Farmer FIRST Programme, ICAR-MGIFRI organized a training on Integrated Farming Systems, soil health management, balanced fertilizer use and summer mungbean cultivation for farmers of Tetaria Block. Farmer FIRST (Farm, Innovations, Resources, Science and Technology) is ICAR's programme to place farmers at the centre of technology development, validation and adoption.

Dr. Raghavendra Singh, Director, highlighted IFS for enhancing farm income and resilience, encouraging diversification through fish-based farming, goat rearing, backyard poultry and crop-based interventions, alongside Resource Conserving Technologies such as laser land

levelling and "Khet ka Pani Khet Mein" water management.

Dr. Vijay Singh Meena explained that summer mungbean can fix approximately 25–30 kg nitrogen per hectare (equivalent to 55–65 kg urea, or 1.2–1.5 bags), while Dhaincha contributes 50–60 kg nitrogen per hectare. A special demonstration on mungbean root nodulation led farmers to describe the nodules as a "natural urea factory in the field." Dr. Amol K. Jadhav reinforced the message on judicious fertilizer use and biofertilizer adoption. Fifty-four participants — 38 male and 16 female farmers — took part, and the ICAR-MGIFRI team also reviewed ongoing Farmer FIRST activities and collected feedback from both adopted and non-adopted farmers to refine future village-level strategies.



Dr. Raghavendra Singh, Director, ICAR–MGIFRI, interacting with farmers during the Farmer FIRST Programme at Tetaria Block. He presented an overview of the Institute's research and extension initiatives and emphasized the role of Integrated Farming Systems (IFS) in building resilient, profitable, and sustainable farming enterprises. The address highlighted the integration of crops, horticulture, livestock, fisheries, agroforestry, and resource recycling with soil health restoration through the "Test Before You Invest" campaign, soil test-based nutrient management, balanced fertilization, green manuring, conservation agriculture, and climate-smart technologies. Farmers were encouraged to adopt location-specific integrated farming approaches for improving productivity, nutritional security, environmental sustainability, and household income.



Dr. Raghavendra Singh interacting with progressive farmers during a field visit, highlighting the role of Integrated Farming Systems in improving soil health, resource-use efficiency, climate resilience, and farm profitability under the Khet Bachao Abhiyan.



Dr. Vijay Singh Meena addressing farmers on scientific approaches for managing waterlogged agroecosystems under the Khet Bachao Abhiyan. The session highlighted resource-conserving technologies such as precision land levelling, scientific drainage management, zero-tillage crop establishment, residue recycling, green manuring, soil test-based balanced nutrient management, and crop diversification for restoring soil health and improving nutrient-use efficiency. Farmers were encouraged to adopt Integrated Farming Systems (IFS), including crops, horticulture, livestock, fisheries, and agroforestry, as climate-resilient options for maximizing productivity, improving farm income, and strengthening resilience to floods and erratic rainfall



Integrated Farming System (IFS) model established at a farmer's field, showcasing the integration of a farm pond, duck rearing, poultry, and crop production. The model demonstrates circular resource flows, where organic wastes from ducks and poultry are recycled as nutrient sources for fish production and crop cultivation, while the farm pond provides irrigation, water storage, and an additional income source. The integrated approach enhances soil fertility, improves water-use efficiency, increases farm productivity and profitability, diversifies livelihood opportunities, and builds resilience against climate variability. The model was promoted under the Khet Bachao Abhiyan as an example of sustainable, resource-efficient, and climate-smart agriculture.



During his visit to the mushroom production unit, Dr. Raghavendra Singh, Director, ICAR–MGIFRI, interacted with progressive mushroom growers and discussed the importance of mushroom cultivation as a resource-efficient enterprise under Integrated Farming Systems (IFS). He explained how agricultural residues such as paddy straw can be converted into high-value edible mushrooms, contributing to efficient biomass utilization, circular resource use, and additional farm income. The discussion also focused on scientific production techniques, quality spawn, hygienic cultivation, value addition through drying and processing, attractive packaging, branding, market linkages, and entrepreneurship development. He encouraged farmers to integrate mushroom production with crops, livestock, horticulture, and other farm enterprises to enhance profitability, nutritional security, and climate resilience while promoting sustainable agricultural development.



Dr. Shailesh Kumar Singh demonstrating the formation of active root nodules in mungbean and explaining their role in biological nitrogen fixation under the Khet Bachao Abhiyan. Farmers observed healthy pink nodules containing Rhizobium bacteria, which convert atmospheric nitrogen into plant-available forms. The session highlighted the importance of pulse-based crop diversification for improving soil fertility, increasing soil organic carbon, enhancing microbial biodiversity, reducing nitrogen fertilizer requirements, and improving the productivity and sustainability of cereal-based cropping systems. The demonstration reinforced the campaign's message that legumes are "nature's nitrogen factories" and an essential component of climate-smart and soil health-centred agriculture.



During the field inspection of an Integrated Farming System (IFS) model, Dr. Raghavendra Singh, Director, ICAR–MGIFRI, reviewed the performance of the integrated farm enterprises and held detailed discussions with farmers on improving system productivity and profitability. He recommended strengthening linkages among crop production, horticulture, fisheries, livestock, duckery, poultry, mushroom cultivation, composting, and on-farm resource recycling to achieve a circular and resource-efficient farming system. He also highlighted the importance of soil test-based nutrient management, efficient water use, diversification into high-value enterprises, value addition, and market-oriented production to enhance household income, nutritional security, resilience to climate variability, and sustainable agricultural development under the Khet Bachao Abhiyan.



During the valedictory session of the Farmer FIRST Programme at Tetaria Block, Dr. Vijay Singh Meena, Senior Scientist (Soil Science), demonstrated the importance of earthworms as "nature's soil engineers" and explained their role in maintaining healthy, biologically active soils. He discussed how earthworm activity improves soil aggregation, porosity, organic matter decomposition, nutrient availability, and root growth. The session further highlighted the benefits of zero-tillage, crop residue recycling, and scientifically planned crop calendars involving cereals, pulses, oilseeds, and green manure crops for improving resource-use efficiency and sustaining soil fertility. Farmers were encouraged to adopt these integrated soil management practices to restore soil health, reduce production costs, improve climate resilience, and achieve long-term agricultural sustainability through the Khet Bachao Abhiyan.

ICAR-MGIFRI and KVK Sheohar, Narainpur & Mesuara Villages, Piprahi Block:

ICAR-MGIFRI and KVK Sheohar organized a farmer awareness programme at Narainpur and Mesuara villages, Sheohar district, focused on soil health conservation, balanced fertilizer use, crop diversification and sustainable practices to reduce excessive chemical dependence. Dr. P. K. Bharti opened the discussion on the campaign's objectives; farmers were sensitized on balanced use of fertilizers and biofertilizers in rice, maize and wheat, and on green manuring through Dhaincha, green gram and Azolla.

Dr. Amol K. Jadhav emphasized that at least one pulse crop in the annual cycle can significantly improve soil fertility, while Dr. Anuradha Ranjan

Kumari, Head and Senior Scientist, encouraged vermicomposting as a sustainable nutrient source.

Special emphasis was given to IFS for the waterlogged and flood-prone regions of North Bihar, integrating crop, livestock, fishery and horticultural enterprises to improve resilience, income and resource-use efficiency. Farmers raised concerns about the lack of electricity connections for irrigation pumps, which was noted by state government officials for follow-up.

A total of 117 farmers — 84 male and 33 female — participated, along with Shri Vinod Mahato, Sarpanch, and Shri Haidar Ali, Block Technology Manager.



The Farmer Awareness Programme at Narainpur Village, Sheohar district, was formally inaugurated with the lighting of the ceremonial lamp (Deep Prajwalan), marking the beginning of a community-based knowledge-sharing programme under the Khet Bachao Abhiyan. The inaugural session included a welcome address introducing the objectives of the month-long campaign, which focuses on restoring soil health, promoting scientific and balanced nutrient management, encouraging soil testing before fertilizer application, increasing soil organic matter through green manuring and crop residue recycling, adopting conservation agriculture and Integrated Farming Systems (IFS), and strengthening climate-resilient agricultural practices. The programme emphasized collaborative efforts among farmers, scientists, extension agencies, and local institutions to achieve sustainable agricultural development and long-term soil fertility.



Dr. Amol K. Jadhav delivering a technical session on balanced fertilizer management for the rice–maize–wheat cropping system at Piprahi Block under the Khet Bachao Abhiyan. The discussion focused on the scientific use of fertilizers based on soil testing, integrated nutrient management through the combined application of chemical fertilizers and organic sources, correction of micronutrient deficiencies, and adoption of the 4R Nutrient Stewardship framework. He highlighted that balanced nutrient management not only improves crop productivity and fertilizer-use efficiency but also enhances soil organic carbon, strengthens soil biological activity, reduces nutrient losses to the environment, and supports long-term sustainability of intensive cereal-based farming systems.



Scientists presenting the scientific principles and field applications of green manuring and biological nitrogen sources during the Khet Bachao Abhiyan. The presentation emphasized the use of Dhaincha (*Sesbania aculeata*), mungbean, cowpea, and other leguminous crops for biological nitrogen fixation, biomass production, soil organic carbon enhancement, and improvement of soil physical, chemical, and biological properties. The role of Rhizobium inoculation, biofertilizers, and integrated nutrient management was also discussed as a means to increase nutrient-use efficiency, reduce synthetic nitrogen fertilizer requirements, improve soil biodiversity, and promote climate-resilient agriculture. Farmers were encouraged to adopt these nature-based nutrient management practices as cost-effective and environmentally sustainable solutions for long-term soil fertility restoration under the "Test Before You Invest" campaign.



Dr. P. K. Bharti, Senior Scientist (Livestock Production and Management), engaging with farmers on the principles and benefits of Integrated Farming Systems (IFS) during the Khet Bachao Abhiyan in Sheohar. He explained how integrating livestock with crop production, horticulture, fisheries, poultry, duckery, fodder cultivation, and on-farm resource recycling creates a resilient and self-sustaining farming system. The session emphasized efficient utilization of crop residues as livestock feed, recycling of animal waste into organic manure, improved soil fertility, reduced external input dependence, enhanced household nutritional security, and diversified income generation. Farmers also received practical guidance on enterprise selection, scientific livestock management, and location-specific IFS models suitable for small and marginal farming systems.



An overwhelming response from the farming community, particularly women farmers, marked the Khet Bachao Abhiyan awareness programme in Sheohar. Women actively participated in discussions on soil testing, balanced nutrient management, green manuring, biofertilizers, conservation agriculture, crop diversification, kitchen gardening, and Integrated Farming Systems (IFS). Their active engagement reflected the growing role of women in adopting scientific agricultural technologies, promoting soil health restoration, improving family nutrition, and enhancing climate resilience through sustainable farming practices. The programme reaffirmed that empowering women farmers is fundamental to achieving long-term agricultural sustainability and resilient rural livelihoods.

Farmer FIRST Village, Ujhilpur, Tetaria Block: At Ujhilpur, one of the adopted villages under ICAR's Farmer FIRST Programme, scientists combined soil health awareness with ongoing Farmer FIRST interventions. Dr. S. K. Singh covered balanced use of chemical fertilizers and biofertilizers, green manuring through Dhaincha, inclusion of green gram and Azolla, and integration of pulses and

legumes into cropping systems. Dr. Koushik Banerjee reinforced the pulse-inclusion message, and Dr. Lamella Ojha stressed soil testing ahead of fertilizer application. Thirty-nine farmers participated, several sharing their own experience of cultivating summer green gram and its role in reducing nitrogen requirements for the succeeding rice crop.



The Farmer FIRST Village Awareness Programme at Ujhilpur served as a platform for strengthening farmer–scientist interaction and promoting climate-smart agricultural technologies under the Khet Bachao Abhiyan. Scientists demonstrated the importance of soil testing before fertilizer application, integrated nutrient management using organic and inorganic sources, biological nitrogen fixation through legumes and green manures, crop residue recycling, conservation agriculture, and Integrated Farming Systems (IFS). Farmers actively participated in discussions on improving soil fertility, increasing nutrient-use efficiency, reducing production costs, and adopting diversified, resilient farming systems for sustainable agricultural development and enhanced livelihoods.



Dr. Lamella Ojha, Scientist (Animal Nutrition), delivering a technical session on scientific animal nutrition during the Farmer FIRST Village Awareness Programme at Ujhilpur. She explained the importance of balanced rations, quality fodder production, mineral supplementation, silage and hay preparation, and efficient utilization of crop residues for improving livestock productivity and profitability. The discussion highlighted the integration of livestock with crop production as a key component of Integrated Farming Systems (IFS), where livestock provide valuable organic manure for soil fertility improvement while crops supply fodder and feed resources. The session reinforced the role of scientific animal nutrition in enhancing household income, nutritional security, resource recycling, and climate-resilient agriculture.

Fisheries-Integrated Farming, Janerwa Village, Banjaria Block: ICAR-MGIFRI, KVK Parsauni and the ATMA team organized a Kisan Chaupal at Janerwa village attended by 42 farmers. Dr. Anshu Gangwar discussed laser land levelling and Happy Seeder technology for reducing residue burning, while Dr. Vijay Singh Meena covered green manuring and crop-calendar-based varietal selection.

Dr. Ravi Kumar demonstrated how integrating fisheries with crop production can provide year-round income and strengthen farm resilience, particularly suited to waterlogged areas of North Bihar, and Dr. Pratap M. G. discussed fish health management — water quality, disease prevention and balanced feeding — as a complement to crop-based IFS.



Dr. Ravi Kumar, Scientist (Fisheries Resource Management), delivering a technical session during the Kisan Chaupal at Janerwa Village on fish-based Integrated Farming Systems (IFS). He explained how farm ponds can serve as the central component of integrated farming by linking fish culture with crop production, duck rearing, poultry, horticulture, and livestock enterprises. The discussion emphasized efficient recycling of organic wastes, utilization of pond water for supplemental irrigation, improved nutrient cycling, enhanced water-use efficiency, diversified farm income, and year-round livelihood opportunities. Farmers also received guidance on scientific fish farming practices, pond management, species selection, feeding, and integration strategies to strengthen climate resilience and promote sustainable agricultural development under the Khet Bachao Abhiyan.



Dr. Ashish Rai demonstrating the benefits of Sesbania (Dhaincha) as a green manure crop and explaining the formation of nitrogen-fixing root nodules during the Khet Bachao Abhiyan. He highlighted that legume-based green manuring naturally supplies nitrogen, produces large quantities of biomass, improves soil organic carbon, enhances nutrient cycling, and strengthens soil biological activity. The discussion also addressed the adverse impacts of crop residue burning, including nutrient losses (particularly nitrogen, phosphorus, potassium, and sulphur), deterioration of soil physical and biological properties, increased atmospheric pollution, and reduced long-term soil productivity. Farmers were encouraged to recycle crop residues, incorporate green manure crops before flowering, and adopt conservation agriculture practices to improve soil fertility, reduce fertilizer dependence, and build climate-resilient farming systems.

Soil Health and IFS, Village Parsa, Majhauria

Block: ICAR-MGIFRI and KVK Madhopur organized a farmer awareness-cum-training programme at Village Parsa, West Champaran, attended by 37 farmers. Dr. S. K. Singh opened with the campaign's objectives, and scientists sensitized farmers on balanced fertilizer and biofertilizer use in rice, maize and wheat, and on green manuring

through Dhaincha, green gram and Azolla. Dr. A. P. Singh, Senior Scientist, highlighted vermicomposting, and Dr. Koushik Banerjee reinforced pulse-crop inclusion. Special emphasis was again placed on IFS for the waterlogged, flood-prone regions of North Bihar, integrating crops, livestock, fisheries and horticulture to improve resilience and income.



A farmer training programme on Integrated Farming Systems (IFS) and soil health restoration was organized at KVK Madhopur under the Khet Bachao Abhiyan. Dr. A. P. Singh, Senior Scientist & Head, KVK Madhopur, inaugurated the programme and highlighted the role of KVKs in technology dissemination and farmer capacity building. Dr. Shailesh Kumar Singh, Principal Scientist (Agronomy) and Co-Nodal Officer, Khet Bachao Abhiyan, delivered a technical session on the scientific management of soil health through the "Test Before You Invest" campaign, soil test-based balanced nutrient management, 4R Nutrient Stewardship, conservation agriculture, green manuring, crop diversification, and Integrated Farming Systems. The programme encouraged farmers to integrate crops, livestock, horticulture, fisheries, and resource recycling to improve productivity, profitability, nutritional security, and resilience to climate variability.



Dr. A. P. Singh, Senior Scientist & Head, KVK Madhopur; Dr. Vijay Singh Meena, Senior Scientist (Soil Science) and Nodal Officer, Khet Bachao Abhiyan; Dr. Subham Mukherjee, Scientist (Soil Science); and Er. Vikas Paradkar, Scientist (Farm Machinery and Power Engineering), reviewing the performance of a 30-day-old Dhaincha (*Sesbania aculeata*) green manuring crop during a field inspection. The scientists evaluated crop growth, root nodulation, biomass production, and field management practices, and explained that incorporation at the pre-flowering stage provides maximum organic biomass and biologically fixed nitrogen. The discussion emphasized the role of Dhaincha in improving soil organic carbon, soil structure, microbial biodiversity, water-holding capacity, and nutrient-use efficiency while reducing dependence on chemical nitrogen fertilizers. Farmers also received guidance on integrating green manuring with conservation agriculture, zero tillage, residue retention, and soil test-based nutrient management to restore soil health and build climate-resilient farming systems under the Khet Bachao Abhiyan.



Discussion on root nodulation, biomass production, and field management practices, and explained that incorporation at the pre-flowering stage provides maximum organic biomass and biologically fixed nitrogen.

IFS and Fish-Based Farming, Chakia Block: At Chakia Block, ICAR-MGIFRI, ATMA and the Department of Agriculture organized a farmer awareness programme on IFS, soil health restoration and fish-based farming models suited to waterlogged, low-lying agroecosystems, attended by 36 farmers (24 male, 12 female). Dr. Vijay Singh Meena highlighted the importance of

legume inclusion in the cropping system and soil-test-based nutrient management. Dr. Ravi Kumar explained how nutrient-rich pond water can be used for irrigation, recycling nutrients and reducing fertilizer needs, while Dr. Pratap M. G. discussed fish health management as an integral part of diversified farming systems.



During a field visit under the Khet Bachao Abhiyan, Dr. Ravi Kumar, Dr. Vijay Singh Meena, and Dr. Pratapa M. G. held an interactive discussion with a farm family to design a customized Integrated Farming System (IFS) model. The scientists evaluated the farm's natural resources, existing enterprises, labour availability, water resources, and market opportunities before recommending an integrated approach involving crop production, fish farming, livestock, poultry, horticulture, fodder cultivation, composting, and efficient recycling of farm residues. The family was also advised on soil test-based nutrient management, efficient water use, pond management, enterprise diversification, value addition, and market linkages. The interaction demonstrated the importance of participatory planning in developing sustainable, profitable, and climate-resilient farming systems that improve livelihood security while conserving natural resources



Dr. Ravi Kumar , Scientist (FRM), delivering a technical session on fish health management during the Farmer Awareness Programme at Chakia Block. He explained the importance of maintaining optimum water quality, balanced feeding, pond sanitation, disease surveillance, and preventive health management for improving fish survival, growth, and productivity. The session also highlighted the integration of aquaculture with crop production, livestock, duckery, and horticulture through Integrated Farming Systems (IFS), where nutrient recycling and efficient resource utilization enhance farm profitability and sustainability. Farmers received practical guidance on maintaining healthy fish stocks, reducing disease incidence, and developing resilient pond-based farming systems under the Khet Bachao Abhiyan.



Scientists and farmers engaging in a technical discussion on fish-based Integrated Farming Systems (IFS) as a climate-resilient solution for the waterlogged agroecosystems of Bihar. The session emphasized transforming waterlogged and flood-prone areas into productive farming systems by integrating fisheries with paddy cultivation, horticulture, duckery, poultry, livestock, and fodder production. Scientists highlighted the importance of scientific pond design, water quality management, nutrient recycling, utilization of pond water for irrigation, and recycling of farm by-products to maximize resource-use efficiency. Farmers were encouraged to adopt location-specific fish-based IFS models to diversify income, improve household nutrition, reduce climate-related production risks, and strengthen sustainable livelihoods under the Khet Bachao Abhiyan.

Farmers' Exposure Visit to Naubatpur, Patna:

ICAR-MGIFRI organized a farmers' exposure visit to a Khet Bachao Abhiyan programme held at Naubatpur, Patna, giving nearly 60 progressive farmers from East Champaran a first-hand look at Integrated Farming Systems and other climate-resilient technologies. Dr. Ravi Kumar explained

the concept of the soil–crop–livestock–fish–human health continuum, and Dr. Amol K. Jadhav highlighted green manuring, direct-seeded rice and crop residue recycling as complementary practices. Farmers pledged to share what they learned with fellow villagers, becoming, in effect, ambassadors of the campaign.



Farmers from East Champaran visited the Integrated Farming System (IFS) Demonstration Site at Naubatpur, Patna, as part of the Khet Bachao Abhiyan to gain first-hand experience of climate-resilient and resource-efficient farming models. The programme was inaugurated by Shri Shivraj Singh Chouhan, Hon'ble Union Minister of Agriculture & Farmers Welfare, Government of India, who emphasized the importance of Integrated Farming Systems for enhancing farmers' income, conserving natural resources, and ensuring sustainable agricultural development. During the exposure visit, farmers interacted with scientists and observed successful models integrating crops, horticulture, fisheries, livestock, poultry, duckery, and resource recycling. The visit demonstrated practical approaches for improving soil health, optimizing water use, increasing resource-use efficiency, promoting value addition, and building resilient farming systems suitable for Bihar's diverse agroecosystems.



ORCHARD HEALTH: MANGO, LITCHI AND PAPAYA



Dr. S. K. Purbey, Principal Scientist (Fruit Science), delivering a technical presentation on scientific nutrient management in litchi orchards during the Khet Bachao Abhiyan. He explained the concept of nutrient budgeting, emphasizing that continuous fruit harvesting removes substantial amounts of essential plant nutrients, which must be replenished through balanced fertilization and integrated nutrient management to prevent soil nutrient mining. The discussion highlighted the importance of soil test-based fertilizer recommendations, periodic leaf nutrient analysis, application of organic manures, vermicompost, green manures, biofertilizers, mulching, and recycling of orchard pruning residues to improve soil organic carbon, microbial activity, nutrient cycling, and water-holding capacity. Farmers also received guidance on stage-specific nutrient application, micronutrient management, and efficient irrigation practices to enhance nutrient uptake, improve fruit quality, sustain orchard productivity, and strengthen the long-term health of litchi-based production systems.

Bihar's fruit economy — anchored by mango, litchi and papaya — depends on the same soil-health principles as field crops, but with its own technical detail: nutrient removal per tonne of fruit, stage-specific fertilizer splits, and micronutrient sprays timed to flowering and fruit-set. This chapter gathers the campaign's orchard-focused programmes.

Scientific Nutrient Management in Litchi:

Litchi, popularly known as the "Queen of Fruits," is one of Bihar's most remunerative fruit crops. Dr. S.

K. Purbey, Principal Scientist, informed farmers that every one tonne of litchi fruit removes approximately 2.2 kg nitrogen, 2.2 kg phosphorus (P_2O_5), 6.6 kg potassium (K_2O), 1.6 kg calcium (CaO) and 1.1 kg magnesium (MgO) from the soil. With India's average litchi productivity of about 7.65 tonnes per hectare, orchards annually remove nearly 16.8 kg N, 16.8 kg P_2O_5 , 50.5 kg K_2O , 12.2 kg CaO and 8.4 kg MgO per hectare — nutrients that must be replenished through balanced fertilization and organic sources.

Farmers were told that fertilizers contribute nearly 50–70% of final fruit yield, and were advised on micronutrient foliar sprays for deficiency symptoms: 0.2% Zinc Sulphate and 0.2% Copper Sulphate during February–March, 0.2% Manganese Sulphate during vegetative growth, and 0.2% Boric Acid during fruit development.

On timing, pre-bearing trees should receive urea in three equal splits (February–March,

June–July, August–September), while bearing trees should receive two splits (mid-February and after fruit set in April); FYM, SSP and MOP should preferably be applied in December. Fertilizers should be applied in circular bands under the canopy — not near the trunk, since most active feeder roots lie in the upper 60–90 cm beneath the canopy.

Thirty-three farmers participated in the programme.



Dr. S. K. Purbey and Dr. N. B. Patil conducting a technical session for litchi growers on soil test-based nutrient management, integrated orchard nutrition, Integrated Pest Management, and sustainable litchi production under the Khet Bachao Abhiyan.

Scientific Nutrient Management in Mango

Orchards: Dr. S. K. Purbey emphasized that balanced nutrient management is the cornerstone of profitable mango production, with declining soil organic carbon and indiscriminate fertilizer use identified as major causes of reduced orchard productivity. Dr. Vijay Singh Meena demonstrated stage-specific nutrient schedules: newly established orchards need 50 g azotobacter, 50 g Phosphate Solubilizing Bacteria (PSB) and 3 kg vermicompost per plant in a 15–20 cm deep circular trench; fully grown orchards need an annual dose of 1500 g nitrogen, 500 g phosphorus, 1000 g potassium and 40–50 kg FYM

per tree, split half-nitrogen with full P and K at monsoon onset and the remaining nitrogen at flowering.

Fertilizer doses should always be adjusted to soil-test results: increased by 50% in extremely deficient soils, by 25% in low-fertility soils, kept at 100% under medium fertility, reduced by 25% in nutrient-rich soils, and reduced by 50% where nutrient availability is very high.

For high-density (3-year-old) plantations, a four-stage annual schedule of 300 g N, 150 g P and 300 g K per plant was recommended, split as 120:60:75 g after harvest, 75:60:60 g before

flowering, 60:30:75 g at fruit set, and 45:0:90 g during fruit development. A biofertilizer booster of 5 ml *Azotobacter* and 5 ml PSB per tree can save approximately 15% of the recommended nitrogen and phosphorus requirement.

Micronutrient management focused on zinc, iron and boron: 50 g of a Grade-I micronutrient

mixture (Zn 5%, Fe 2%, Mn 1%, Cu 0.5%, B 1%) incubated with 10 kg FYM per tree after harvest, plus three foliar sprays of 1% water-soluble fertilizer (13:0:45) at the pea, marble and egg-size fruit stages, along with 20 ppm NAA sprays at the pea and marble stages to reduce premature fruit drop.



Dr. S. K. Purbey, Principal Scientist (Fruit Science), conducting a field demonstration on stage-specific nutrient management in mango orchards during the Khet Bachao Abhiyan. The session emphasized the scientific scheduling of nutrient application according to crop growth stages, ensuring balanced nutrition during vegetative growth, flowering, fruit set, fruit enlargement, and post-harvest periods. He highlighted the importance of soil test-based nutrient management, periodic leaf nutrient analysis, integrated application of farmyard manure, vermicompost, green manures, biofertilizers, and macro- and micronutrients to maintain soil fertility and orchard health. Farmers also received guidance on mulching, moisture conservation, fertigation where applicable, and recycling of orchard biomass to improve soil organic carbon, nutrient cycling, fruit yield, quality, and long-term productivity while reducing unnecessary fertilizer use and environmental losses.



Healthy fruit-bearing mango trees demonstrating optimum tree vigor, balanced nutrition, and sustainable orchard management for enhanced productivity and fruit quality.

Soil-Health-Centered Orchard Management: At Chintamanpur village, scientists conducted a training on soil health management, balanced nutrition, eco-friendly pest management and sustainable orchard production, attended by 29 farmers (22 male, 7 female). Dr. Subham Mukherjee stressed that soil testing should be the foundation of all fertilizer decisions in orchards, as in field crops.

For mango, balanced FYM with recommended

NPK doses was emphasized, discouraging excess nitrogen, which promotes vegetative growth at the expense of flowering and fruiting. For litchi, FYM, phosphorus and potash after harvest, with nitrogen in split doses, was recommended, along with neem cake and karanj cake for soil health and reduced soil-borne pest incidence. Dr. N. B. Patil covered eco-friendly IPM approaches — orchard sanitation, pruning and biological control — for both crops.



Dr. Subham Mukherjee, Scientist (Soil Science), delivering a technical training programme on soil health-centred orchard management at Chintamanpur Village during the Khet Bachao Abhiyan. He explained the importance of maintaining healthy soils through regular soil testing, balanced nutrient replenishment, integration of organic and inorganic nutrient sources, crop residue recycling, green manuring, mulching, and conservation of soil moisture. Farmers also received practical guidance on improving soil organic carbon, enhancing microbial activity, correcting micronutrient deficiencies, managing soil pH, and adopting climate-resilient orchard management practices. The session reinforced that sustained orchard productivity and superior fruit quality depend on scientifically managing soil as a living resource rather than merely applying fertilizers.



Dr. N. B. Patil, Senior Scientist (Agricultural Entomology), delivering a technical session on Nature-Based Solutions (NbS) for sustainable pest management in mango and litchi orchards during the Khet Bachao Abhiyan. He explained how ecological approaches, including Integrated Pest Management (IPM), biological control, conservation of pollinators and natural enemies, botanical biopesticides (such as Dashparni Ark, neem extracts, and Trichoderma-based formulations), habitat management, orchard sanitation, and need-based pest monitoring can effectively suppress insect pests while reducing reliance on synthetic pesticides. The session highlighted that Nature-Based Solutions not only protect fruit crops from pests but also improve soil biodiversity, preserve ecosystem services, reduce pesticide residues, strengthen climate resilience, and promote environmentally sustainable orchard production. Farmers were encouraged to integrate these eco-friendly technologies with balanced nutrient management and soil health restoration for long-term productivity and ecological sustainability.

Scientific Papaya Cultivation: Dr. S. K. Purbey highlighted papaya as one of the most profitable fruit crops, bearing fruit within 8–10 months and continuing production for 2–3 years. Ideal conditions are 22–35°C, 1000–1500 mm annual rainfall, and well-drained sandy loam to loam soils of pH 6.0–7.5, with waterlogging strictly avoided. Recommended cultivars for the region include Red Lady, Pusa Delicious, Pusa Dwarf, Pusa Nanha, Ranchi Dwarf and select Taiwan hybrids.

Dr. Amol K. Jadhav advised June–July planting at 2.0 × 2.0 m spacing (1.8 × 1.8 m for high-density systems), with 60 × 60 × 60 cm pits filled with 15–20 kg FYM, 1 kg neem cake, 250 g single super phosphate and 50 g Trichoderma. Annual nutrition of 250 g N, 250 g P₂O₅, 500 g K₂O and 15–20 kg FYM per plant was recommended in 6–8 split applications, along with 50 g each of Azotobacter and PSB and 2–3 kg vermicompost per plant.

Dr. Vijay Singh Meena stressed that soil testing should precede fertilizer application, noting that combining the recommended NPK dose with biofertilizers such as *Azotobacter*, *Azospirillum* and PSB significantly improves growth, nutrient uptake, fruit yield and fruit quality compared with chemical fertilizers alone. Irrigation every 5–7 days in summer and 10–15 days in winter was advised, with drip irrigation preferred where possible.

Dr. N. B. Patil covered eco-friendly pest and disease management — rogueing virus-infected plants and controlling aphid vectors for Papaya Ring Spot Virus, maintaining drainage and applying Trichoderma against stem and root rot, and using methyl eugenol traps against fruit flies. Scientific management can yield 60–100 tonnes of fruit per hectare, rising to 100–150 tonnes under intensive management with high-yielding hybrids.



Dr. Amol K. Jadhav, Scientist (Fruit Science), conducting a field demonstration on scientific papaya orchard establishment under the Khet Bachao Abhiyan. He explained the importance of selecting well-drained fertile soils, carrying out soil testing before planting, preparing nutrient-enriched planting pits using farmyard manure, vermicompost, and biofertilizers, and following recommended plant spacing for optimum canopy development. The session emphasized stage-specific nutrient management based on soil and crop requirements, efficient irrigation and moisture conservation through mulching, integrated pest and disease management, and timely intercultural operations. Farmers also learned how scientific orchard establishment improves root development, nutrient-use efficiency, soil health, fruit yield, fruit quality, and long-term orchard sustainability while reducing production risks and input costs..



Progressive farmers interacting with Dr. Raghavendra Singh, Director, ICAR–MGIFRI, and institute scientists during a field visit on scientific papaya cultivation and orchard management. The Director highlighted the importance of Nature-Based Solutions (NbS) as an environmentally sustainable approach to pest management, promoting the use of solar-powered insect light traps, pheromone traps, yellow and blue sticky traps, biological control agents, botanical pesticides, habitat management, and conservation of beneficial insects as key components of Integrated Pest Management (IPM). Scientists demonstrated how these eco-friendly technologies effectively suppress insect pests while minimizing pesticide residues, protecting pollinators and natural enemies, improving soil biodiversity, and reducing environmental pollution. Farmers were encouraged to integrate these approaches with balanced nutrient management, soil health restoration, scientific orchard management, and Integrated Farming Systems (IFS) to achieve sustainable, profitable, and climate-resilient fruit production.

Fruit-Based Integrated Farming Systems, Dhobia

Tola, Turkaulia Block: In a region where mango, litchi and papaya are major income-generating enterprises, ICAR-MGIFRI and the Department of Agriculture organized a joint awareness programme at Dhobia Tola, attended by 44 farmers (30 male, 14 female). Dr. S. K. Purbey reiterated mango nutrition norms (about 1.5 kg N, 0.5 kg P and 1.0 kg K per tree annually, with 40–50 kg FYM), while Dr. Amol K. Jadhav covered litchi

nutrition and papaya fertigation practices — 13.5 g urea and 10.5 g muriate of potash per plant per week under drip irrigation, with 0.5% zinc sulphate and 0.1% boric acid sprays during the fourth and eighth months after planting.

The programme also emphasized integrating fruit crops with livestock, vermicomposting, green manuring and resource recycling as part of fruit-based Integrated Farming Systems, to enhance income and strengthen climate resilience.



Dr. S. K. Purbey delivering a technical session on fruit-based Integrated Farming Systems (IFS) at Dhoibia Tola. He highlighted the integration of fruit orchards with annual crops, vegetables, fodder, livestock, fisheries, poultry, and beekeeping to maximize land productivity and improve resource-use efficiency. The discussion focused on maintaining healthy orchard soils through soil test-based balanced nutrient management, application of organic manures and biofertilizers, green manuring, residue recycling, mulching, and efficient irrigation. He also emphasized enterprise diversification, value addition, and market-oriented production as strategies for enhancing farm income, reducing production risks, conserving natural resources, and building climate-resilient farming systems under the Khet Bachao Abhiyan.



Dr. Amol K. Jadhav, Scientist (Fruit Science), conducting a technical session with orchard growers on scientific nutrient management for mango, litchi, and papaya during the Khet Bachao Abhiyan. The discussion focused on the principles of soil health-centred orchard management, including soil testing before fertilizer application, periodic leaf nutrient analysis, stage-specific nutrient scheduling, correction of micronutrient deficiencies, integration of farmyard manure, vermicompost, green manures, biofertilizers, and mulching, along with efficient irrigation management. He explained the concept of nutrient budgeting, highlighting that nutrients removed through fruit harvest must be replenished to prevent soil nutrient depletion and sustain orchard productivity. Farmers also received guidance on improving soil organic carbon, enhancing microbial activity, conserving moisture, and adopting climate-resilient orchard management practices to achieve higher fruit yield, superior fruit quality, and long-term sustainability.



FARMER INSTITUTIONS AND GOVERNANCE



Reaching individual farmers is necessary but not sufficient — sustaining a soil-health movement requires institutions: Panchayats, Farmer Producer Organizations, and targeted support for Scheduled Caste farming communities. This chapter documents how the campaign engaged these structures, including its reach into one of India's frontier border villages.

SCSP Input Distribution, Karariya Village, Kotwa Block

ICAR-MGIFRI organized a farmer awareness and input distribution programme integrating soil health messaging with support under the Scheduled Caste Sub-Plan (SCSP), attended by 60 farmers (40 women, 20 men). Discussions covered green manuring through Dhaincha, crop diversification and soil-test-based nutrient management.

Dr. S. K. Purbey, Principal Scientist, emphasized biofertilizers, biopesticides and organic manures for restoring soil health, stressing that "healthy food originates from healthy soils." Under the SCSP component, farmers received 5 kg paddy seed (Rajendra Masuri/MTU-7029) along with a spade, khurpi and hansiya to support improved crop management.



Dr. S. K. Purbey, Principal Scientist (Fruit Science), delivering the keynote address during the Scheduled Caste Sub-Plan (SCSP) Input Distribution Programme at Karariya Village. He emphasized that the objective of the programme extends beyond input distribution to building farmers' capacity for adopting scientific, climate-resilient agricultural practices. Farmers were advised to utilize the distributed inputs judiciously by following soil test-based recommendations, adopting balanced nutrient management, integrating organic and inorganic nutrient sources, improving soil organic matter through green manuring and residue recycling, and diversifying farm enterprises through horticulture and Integrated Farming Systems (IFS). The programme highlighted the role of technology dissemination and capacity building in improving productivity, strengthening soil health, enhancing nutritional security, and promoting sustainable livelihoods among Scheduled Caste farming communities under the Khet Bachao Abhiyan.



SCSP beneficiary farmers receiving certified paddy seed and farm tools at Karariya Village to promote improved rice cultivation, soil test-based nutrient management, and sustainable agricultural development under the Khet Bachao Abhiyan.

SCSP Support and IFS Awareness: At Gullaria village, Motihari Block, ICAR-MGIFRI integrated soil health awareness with SCSP support for rural households, attended by 40 farmers (18 male, 22 female). Dr. Amol K. Jadhav briefed participants on IFS as a strategy for reducing production risk and enhancing farm income, while Dr. S. K. Purbey

highlighted balanced fertilizer use and biofertilizers.

Under the SCSP component, knapsack sprayers and hand-operated agricultural tools were distributed to 21 beneficiary farmers (13 male, 8 female) to support improved farm management.



SCSP-supported farmer awareness programme, Gullaria village, Lakhaura Panchayat.



Dr. Amol K. Jadhav, Scientist (Fruit Science) and Nodal Officer, Scheduled Caste Sub-Plan (SCSP), distributing knapsack sprayers and essential farm tools to SCSP beneficiary farmers at Gullaria Village. The programme was designed to enhance farm mechanization and improve access to quality agricultural equipment for small and marginal farmers. Dr. Jadhav highlighted the importance of using knapsack sprayers for the judicious and need-based application of pesticides, biofertilizers, and foliar nutrients, thereby improving application efficiency, reducing input wastage, and minimizing environmental contamination. Farmers were also advised to integrate these tools with soil test-based nutrient management, 4R Nutrient Stewardship, Integrated Pest Management (IPM), Nature-Based Solutions (NbS), and climate-smart agricultural practices to enhance productivity, reduce production costs, restore soil health, and strengthen resilient farming systems. The programme reflected ICAR–MGIFRI's commitment to combining technology dissemination, capacity building, and input support for inclusive and sustainable agricultural development.

Panchayat Leadership and Climate-Resilient Agriculture: ICAR-MGIFRI, in collaboration with Siswa Purvi Gram Panchayat, organized a Farmer Training-cum-Kisan Gosthi attended by 58 farmers (41 male, 17 female), graced by Ms. Tanya Parween, Mukhiya, Siswa Purvi Gram Panchayat, Banjaria Block, as Chief Guest. She emphasized climate-resilient agriculture, crop diversification and IFS for year-round income and livelihood security.

Dr. S. K. Singh delivered the keynote technical address on balanced fertilizer use and IFS approaches, and Dr. Koushik Banerjee discussed contingency crop planning under a possible weak or uncertain monsoon linked to El Niño-like conditions, advising greater focus on pulses, oilseeds and Shri Anna (millets) under moisture stress, and cautioning against upland rice cultivation without assured irrigation. Discussions also covered PMFBY (Pradhan Mantri Fasal Bima Yojana) and Kisan Credit Card (KCC) access.



Ms. Tanya Parween, Mukhiya of Siswa Purvi Gram Panchayat, delivering the inaugural address during the Kisan Gosthi organized under the Khet Bachao Abhiyan. She emphasized the vital role of local self-governance institutions in promoting scientific agriculture, community participation, and sustainable natural resource management. Dr. Shailesh Kumar Singh, Principal Scientist (Agronomy) and Co-Nodal Officer, Khet Bachao Abhiyan, presented the objectives of the month-long campaign, highlighting the "Test Before You Invest" initiative, soil test-based balanced nutrient management, green manuring, conservation agriculture, Integrated Farming Systems (IFS), and climate-resilient farming technologies. The programme encouraged active collaboration among Gram Panchayats, farmers, scientists, and extension agencies to accelerate the adoption of sustainable agricultural practices and improve soil health, farm productivity, and livelihood security.



Kisan Gosthi at Siswa Purvi Gram Panchayat under the Khet Bachao Abhiyan. Institute highlighted soil health restoration, the "Test Before You Invest" initiative, conservation agriculture, Integrated Farming Systems, and scientific resource management for sustainable farming under the Khet Bachao Abhiyan.



Scientists from ICAR–MGIFRI monitored the mungbean demonstration plot. The field inspection focused on crop establishment, plant vigour, root nodulation, and biological nitrogen fixation to demonstrate the role of legumes in restoring soil fertility. Scientists explained how integrating mungbean into cereal-based cropping systems improves soil organic carbon, enriches soil nitrogen naturally, enhances microbial activity, and reduces dependence on synthetic nitrogen fertilizers, thereby strengthening climate-resilient and sustainable agriculture.

Reaching India's Frontier Villages: Pantoka Panchayat, Raxaul Block: In one of the campaign's most distinctive outreach events, ICAR-MGIFRI, ATMA and the Department of Agriculture organized a programme at Pantoka Panchayat, Raxaul Block — one of the last Indian village settlements along the India–Nepal international border — jointly conducted under Khet Bachao Abhiyan and the Bihar Krishi Jan Kalyan Chaupal.

The region's rice–wheat-based systems, supplemented by maize, sugarcane, vegetables, livestock and horticulture, were the focus of advisories on balanced fertilizer use, rice nursery

management, green manuring and IFS. Dr. Vijay Singh Meena identified declining soil organic carbon, imbalanced fertilizer application and micronutrient deficiencies as emerging regional challenges, and explained the nitrogen contributions of Dhaincha and summer green gram.

Sixty-two farmers participated — notably 21 male and 41 female — reflecting strong women's participation in this border community, alongside officials from the Department of Agriculture, ATMA functionaries and Panchayat representatives.



Dr. Vijay Singh Meena, Senior Scientist (Soil Science) and Nodal Officer, Khet Bachao Abhiyan, delivering a technical address to farmers at India's frontier village on soil health-centred rice production. He highlighted that healthy soils are the foundation of resilient rice-based farming systems and encouraged farmers to adopt soil test-based balanced nutrient management, green manuring, crop residue recycling, and conservation agriculture practices. The session also focused on climate-resilient rice nursery management, including community nursery establishment, seed treatment, use of quality seed, optimum nursery age, timely transplanting, and scientific crop management practices such as appropriate plant spacing, alternate wetting and drying where feasible, integrated weed and pest management, and stage-specific nutrient application. Farmers were advised to integrate these practices to improve nutrient-use efficiency, reduce production costs, enhance soil organic matter, increase rice productivity, and build resilience against floods, droughts, and other climatic stresses in the eastern Indo-Gangetic Plains.



Farmer awareness programme at Pantoka Panchayat, on the India–Nepal border, Raxaul Block

FPO–Scientist–Progressive Farmer Interface Workshop:

ICAR-MGIFRI organized a one-day FPO–Scientist–Progressive Farmer Interface Workshop bringing together representatives from 14 Farmer Producer Organizations (FPOs), progressive farmers, scientists and extension personnel — 40 participants in total — to discuss sustainable practices, natural farming, value addition, branding, collective marketing and entrepreneurship.

Dr. S. K. Purbey emphasized the role of FPOs in disseminating soil-health technologies, while Dr. S. K. Singh encouraged FPOs to develop village-

level clusters of two to three villages for collective production and marketing, and informed participants about support schemes from the Ministry of Agriculture & Farmers' Welfare, the Small Farmers Agribusiness Consortium (SFAC), NABARD and ATMA.

Participants visited the institute's field demonstration units — fish-based IFS, goat-based IFS, and raised-and-sunken bed IFS models — before committing to promote soil testing, balanced fertilization, green manuring and farmer-led innovation through their FPO networks.



Representatives of Farmer Producer Organizations (FPOs) and progressive farmers participating in an Interface Workshop organized at ICAR–MGIFRI, Motihari, under the Khet Bachao Abhiyan. The workshop served as a platform for dialogue between scientists and farmer leaders on promoting Natural Farming and Nature-Based Solutions (NbS) as complementary approaches to restoring soil health and improving agricultural sustainability. Discussions covered the "Test Before You Invest" campaign, soil test-based balanced nutrient management, green manuring with Dhaincha, biological nitrogen fixation through legumes, biofertilizers, vermicomposting, crop residue recycling, botanical plant protection formulations, conservation agriculture, Integrated Farming Systems (IFS), water conservation, and biodiversity enhancement. Scientists also highlighted the strategic role of FPOs in technology dissemination, aggregation of produce, value addition, market linkages, and collective action for accelerating the adoption of climate-resilient, low-carbon, and resource-efficient farming systems across eastern India.



FPO Representatives, Progressive Farmers, and ICAR–MGIFRI Scientists at the Interface Workshop.



KEY MILESTONE EVENTS



Alongside its steady village-by-village outreach, the campaign in Bihar included three large-scale events that brought national and state leadership directly to farmers, or brought a national scheme directly to the institute's audience. This chapter documents those three moments.

One-Day Workshop: ICAR-MGIFRI, in collaboration with ICAR-IARI Regional Station, Pusa, Samastipur, organized a One-Day Workshop on Khet Bachao Abhiyan under the Scheduled Caste Sub-Plan (SCSP) Scheme. The programme was graced by Shri Radha Mohan Singh, Hon'ble Member of Parliament and Former Union Minister of Agriculture & Farmers' Welfare, Government of India, as Chief Guest, along with Shri Nand Kishor Ram, Hon'ble Minister of Dairy, Fisheries and Animal Resources, Government of Bihar; Shri Krishna Nandan Paswan, Hon'ble MLA; and farmer leader Manoj Paswan.

Shri Radha Mohan Singh emphasized the critical importance of soil conservation and

sustainable nutrient management, the need for regular soil testing, effective use of Soil Health Cards, and reducing indiscriminate urea application, describing Khet Bachao Abhiyan as a flagship campaign closely monitored by the Ministry of Agriculture and Farmers' Welfare.

In his welcome address, Dr. Raghavendra Singh, Director, outlined the campaign's vision as envisaged by Shri Shivraj Singh Chouhan, Hon'ble Union Minister of Agriculture & Farmers' Welfare and Rural Development, and informed the gathering that ICAR-MGIFRI scientists have been conducting intensive village-level outreach across Bihar throughout June 2026.

Around 550 farmers from five blocks (Kotwa, Turkaulia, Motihari, Piprakothi and Chakia) of East Champaran participated. Under the SCSP farmer support initiative, organizers distributed 25 quintals of quality rice seed (varieties PNR-381, Pusa-44 and Pusa-1824), along with 325 mango saplings (Amrapali, Pusa Arunima and Mallika) and 200 litchi saplings (Shahi and China Litchi).

The programme was organized under the guidance of Dr. Raghavendra Singh and concluded with a vote of thanks by Dr. P. R. Kumar, Head, ICAR-IARI Regional Station, Pusa, Samastipur.



The programme was graced by Shri Radha Mohan Singh, Hon'ble Member of Parliament and Former Union Minister of Agriculture & Farmers' Welfare, Government of India, as the Chief Guest, along with Shri Nand Kishor Ram, Hon'ble Minister of Dairy, Fisheries and Animal Resources, Government of Bihar; Shri Krishna Nandan Paswan, Hon'ble MLA; and Shri Manoj Paswan, progressive farmer leader.



More than 550 farmers from Kotwa, Turkaulia, Motihari, Piprakothi, and Chakia blocks of East Champaran actively participated in the One-Day Workshop on Khet Bachao Abhiyan organized under the Scheduled Caste Sub-Plan (SCSP) at ICAR–MGIFRI, Motihari. The workshop provided a platform for farmer–scientist interaction on soil health restoration, "Test Before You Invest", soil test-based nutrient management, balanced fertilizer use, green manuring, conservation agriculture, Integrated Farming Systems (IFS), and climate-resilient farming practices. The enthusiastic participation reflected the growing commitment of farmers towards adopting scientific, resource-efficient, and sustainable agricultural technologies for improving productivity, profitability, and long-term soil health.



Distribution of rice seed, mango and litchi saplings to SCSP beneficiary farmers SCSP beneficiary farmers receiving certified rice seed, mango saplings, and litchi saplings to promote soil health-centred, diversified, and climate-resilient farming systems under the Khet Bachao Abhiyan.

RPCAU Mega Conference: Under Dr. Rajendra Prasad Central Agricultural University (RPCAU), Pusa, a mega district-level conference-cum-training programme on "Khet Bachao Abhiyan, Natural Farming and Kharif Campaign 2026" was organized at KVK Piprakothi, bringing together 4,240 farmers — 3,160 male and 1,080 female — along with scientists, extension personnel, policymakers and public representatives.

A comprehensive technical session on natural farming covered principles and practices, soil health through green manuring and organic amendments, preparation and application of Jeevamrit, Beejamrit and Ghanjeevamrit, integrated nutrient and pest management, and crop residue recycling; four extension folders were released at the event.

Chief Guest Shri Radha Mohan Singh, Hon'ble Member of Parliament, Motihari, and Chairman, Parliamentary Standing Committee on Defence,

stated that "soil is the soul of Indian agriculture," and that healthy soil is the foundation of healthy crops, prosperous farmers and national food security. Special Guest Shri Ramchandra Prasad, Hon'ble Minister, Forest, Environment and Climate Change Department, Government of Bihar, highlighted climate-resilient, resource-efficient agriculture for future food security.

Dr. Ratnesh Kumar Jha, Director of Extension Education, RPCAU, welcomed participants, and Dr. Raghavendra Singh, Director, ICAR-MGIFRI, emphasized balanced fertilizer use and legume/green-manure integration. The event was attended by numerous elected representatives, including MLAs from Harsidhi, Motihari, Pipra, Kalyanpur and Kesaria constituencies, and was jointly coordinated by Dr. A. K. Singh, Senior Scientist & Head, KVK Piprakothi, and Shri Manish Kumar, District Agriculture Officer, Motihari, with support from ICAR-ATARI, Patna.



The Mega District-Level Conference on Khet Bachao Abhiyan, Natural Farming, and Kharif Campaign 2026, organized at KVK Piprakothi, served as a major platform for disseminating science-based, climate-resilient agricultural technologies to the farming community. Scientists emphasized the restoration of soil health through soil test-based balanced nutrient management, green manuring, biological nitrogen fixation, crop residue recycling, biofertilizers, conservation agriculture, and Integrated Farming Systems (IFS). The conference also highlighted the role of Natural Farming and Nature-Based Solutions (NbS) in reducing dependence on external inputs, enhancing biodiversity, conserving soil and water resources, and strengthening climate resilience. Farmers were encouraged to adopt location-specific Kharif crop management practices, diversify production systems, and integrate crops, livestock, horticulture, and fisheries to achieve sustainable productivity, improved livelihoods, and long-term food and nutritional security.



Inaugurating the Mega District-Level Conference through the traditional Deep Prajwalan, symbolizing the beginning of the Khet Bachao Abhiyan, Natural Farming, and Kharif Campaign 2026.



Shri Radha Mohan Singh, Hon'ble Member of Parliament and Former Union Minister of Agriculture & Farmers' Welfare, Government of India, addressing a gathering of more than 4,000 farmers during the Mega District-Level Conference on Khet Bachao Abhiyan, Natural Farming, and Kharif Campaign 2026 at KVK Piprakothi. In his keynote address, he emphasized the urgent need for soil health restoration, regular soil testing, effective utilization of Soil Health Cards, balanced fertilizer use, and judicious application of urea to ensure long-term agricultural sustainability. He highlighted the significance of Natural Farming, Nature-Based Solutions (NbS), and scientific crop management for improving soil fertility, enhancing farmers' income, and building climate-resilient agricultural systems, while appreciating the outreach efforts of the Khet Bachao Abhiyan



The extension publications and technical information folders on Khet Bachao Abhiyan, Natural Farming, soil health management, and climate-resilient agricultural technologies were formally released by Shri Radha Mohan Singh, Hon'ble Member of Parliament and Former Union Minister of Agriculture & Farmers' Welfare, Government of India, along with distinguished dignitaries and scientists during the Mega District-Level Conference on Khet Bachao Abhiyan, Natural Farming, and Kharif Campaign 2026 at KVK Piprakothi. The publications were developed to disseminate science-based recommendations on soil test-based nutrient management, balanced fertilizer use, green manuring, Integrated Farming Systems (IFS), Nature-Based Solutions (NbS), and sustainable crop production, strengthening technology transfer and farmer awareness across the region.



Large farmer gathering at the RPCAU–ICAR-MGIFRI joint conference.

Live Telecast of the PM-KISAN Installment Release:

ICAR-MGIFRI organized a live telecast of the release of the latest PM-KISAN (Pradhan Mantri Kisan Samman Nidhi) installment, during which Hon'ble Prime Minister Shri Narendra Modi transferred more than ₹18,880 crore through Direct Benefit Transfer to over 9.44 crore farmers across the country.

The telecast was attended by 103 participants — 77 male farmers, 15 female farmers, one distinguished guest and 10 other stakeholders. Dr. S. K. Singh highlighted PM-KISAN as one of the flagship programmes providing direct financial support to farmers, strengthening their capacity to invest in agricultural activities, and the event was coordinated under the guidance of Dr. S. K. Purbey.



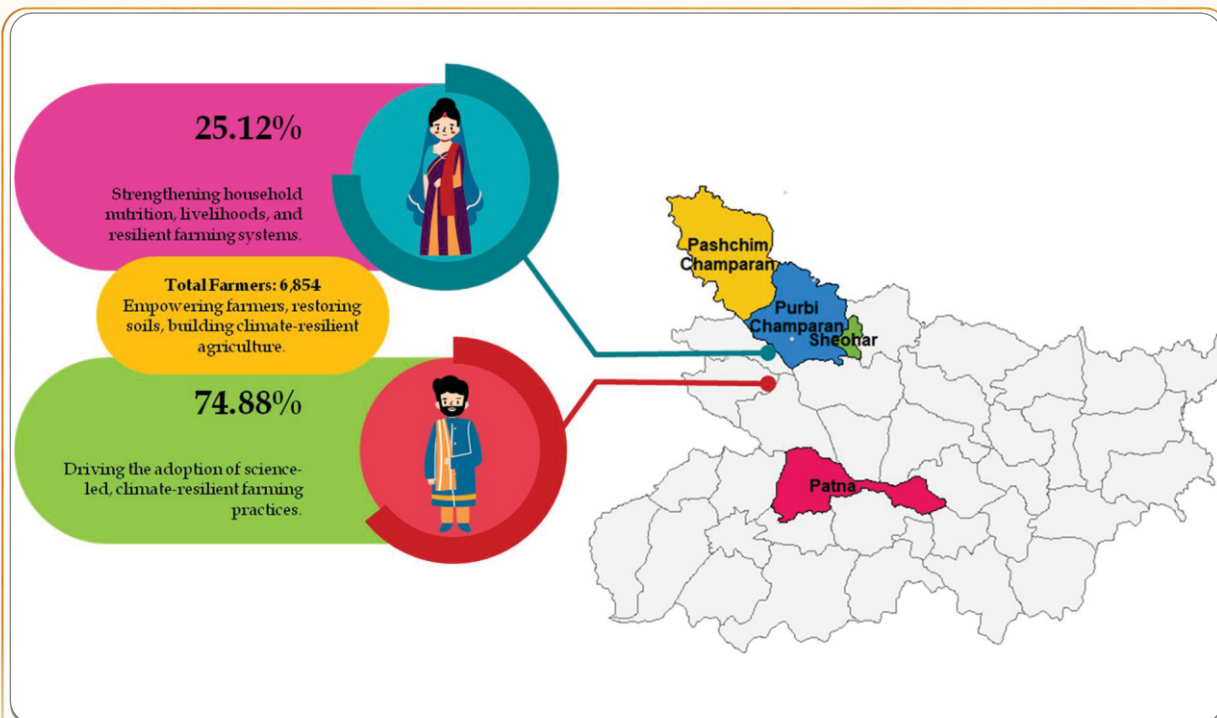
Farmers watch the live telecast of the PM-KISAN installment release, ICAR-MGIFRI.



Scientists and officials interact with farmers during the PM-KISAN telecast programme



IMPACT IN NUMBERS



Campaign summary infographic: 6,854 farmers reached across four districts of Bihar, June 2026.

A month of village-level engagement generates a great deal of qualitative insight — but also a clear quantitative picture of reach. This chapter presents the campaign's headline statistics and the farmer feedback that will shape its next phase.

Campaign-Wide Reach: 6,854 Farmers Across Four Districts: During 1–30 June 2026, ICAR-MGIFRI's campaign reached 6,854 farmers across four districts — East Champaran, West Champaran, Sheohar and Patna — spanning 19 development blocks and 49 villages, through

farmer trainings, Kisan Gosthis, Kisan Chaupals, Mukhiya Sammelans, exposure visits, field demonstrations, FPO–scientist interactions, input-dealer interactions, orchard management programmes and IFS demonstrations.

Of the 6,854 participants, 5,132 were male farmers (74.88%) and 1,722 were female farmers (25.12%) — a participation profile the institute described as reflecting "a strong commitment to inclusive and participatory agricultural extension."



Dr. Raghavendra Singh, Director, ICAR-MGIFRI, reflected: "Khet Bachao Abhiyan has emerged as a people's movement for protecting soil health and promoting sustainable agriculture. Through the collective efforts of ICAR, the Department of Agriculture, ATMA, Krishi Vigyan Kendras, and farming communities, we are successfully translating scientific innovations into field-level adoption. Healthy soils are the foundation of productive agriculture, nutritional security, environmental sustainability, and prosperous farming communities."



Dr. Vijay Singh Meena, Nodal Officer of the campaign, added: "The campaign demonstrates the strength of collaborative agricultural extension. Reaching 6,854 farmers across four districts in one month reflects the effectiveness of coordinated efforts among scientists, KVKs, ATMA, Panchayats, Farmer Producer Organizations, and progressive farmers. The enthusiastic response from farming communities reinforces our commitment to expanding soil-health-centered agriculture and IFS across Bihar for improving productivity, profitability, and climate resilience."

Campaign Reach at a Glance

Metric	Figure
Districts covered	4 (East Champaran, West Champaran, Sheohar, Patna)
Development blocks reached	19
Villages reached	49
Total farmers reached	6,854
Male participants	5,132 (74.88%)
Female participants	1,722 (25.12%)
Scientific teams deployed	4 multidisciplinary teams
Campaign duration	1–30 June 2026

What Farmers Said: Feedback from the Field:

Beyond delivering advisories, the campaign's village-level programmes doubled as a listening exercise. Feedback collected across events indicated that while awareness of balanced fertilizer use is increasing, many farmers still want deeper understanding of soil-test-based fertilizer recommendations, Integrated Nutrient Management (INM), Soil Health Card recommendations, green manuring, biofertilizers, climate-resilient agriculture, and water conservation.

A significant proportion of farmers expressed interest in adopting Integrated Farming Systems — particularly fish-based farming, goat rearing, backyard poultry, horticulture and crop-based enterprises — to diversify income and reduce climate risk. Women farmers specifically

highlighted the need for small-scale IFS models, drudgery-reducing farm tools, and income-generating enterprises suited to household-level implementation.

Farmers also showed strong interest in Dhaincha cultivation, summer mung bean, vermicomposting, crop residue recycling, biofertilizers, natural farming practices and soil testing services, but consistently flagged one practical constraint across multiple villages: the timely availability of quality Dhaincha seed remains a key requirement for large-scale adoption. Participants also asked for more field demonstrations, village-level training and continuous technical guidance — feedback that directly shapes the recommendations in the concluding chapter of this book.



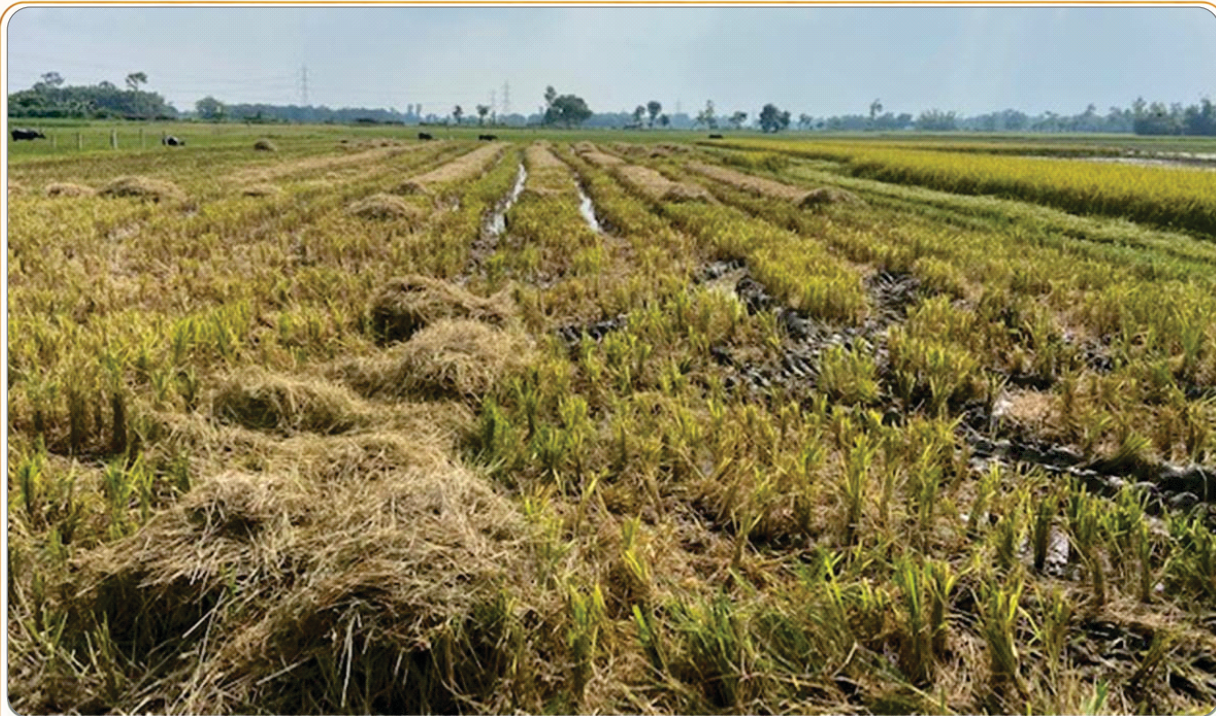
Scientists collect farmer feedback on awareness, adoption and future needs.



Recourse recycling through vermicomposting technique at ICAR-MGIFRI.



IDENTIFICATION OF ISSUES AND PROBLEMS OF FARMERS



KBA-2026, the nationwide campaign of the Ministry of Agriculture & Farmers' Welfare, Government of India, placed the restoration of soil health, judicious and balanced fertilizer use, integrated nutrient management (INM), and climate-resilient farming at the centre of a farmer-first outreach exercise. In Bihar, the Abhiyan was carried forward through the coordinated efforts of ICAR institutes Agricultural University, and the state's network of Krishi Vigyan Kendras (KVKs), working closely with the Department of Agriculture, Government of Bihar, and the Agricultural Technology Management Agency (ATMA) through the Bihar Krishi Jan Kalyan Chaupal outreach platform. A foundational objective of KBA in Bihar was to systematically capture, directly from farmers, the specific soil-health, nutrient-management, water, and allied constraints confronting the state's diverse agro-ecological zones — from the flood-prone diaras and waterlogged tracts of North Bihar to the drought-vulnerable plateau fringe of South Bihar.

Methodology for Identification of Problems:

Village-level outreach under KBA was conducted from 1–30 June 2026 through Farmer Training-cum-Kisan Gosthis, Panchayat-level meetings, and the Bihar Krishi Jan Kalyan Chaupal. Scientists of ICAR, RPCAU and district KVKs engaged farmers through semi-structured interview schedules and open Focused Group Discussions (FGDs), in the same participatory, bottom-up spirit as the earlier Viksit Krishi Sankalp Abhiyan (VKSA, 2025), but with a sharper thematic focus on soil health, balanced nutrient use, and reduction of excessive chemical fertilizer dependence. Issues raised by farmers were recorded and thematically classified into three categories:

1. Researchable issues requiring demand-driven scientific inquiry;
2. Extension issues reflecting knowledge and skill gaps; and
3. Policy issues warranting institutional or regulatory intervention.

Field teams additionally rated the relative severity of each issue, enabling comparative prioritisation across 4 districts of Bihar.

Problems Reported by Farmers: Consistent with the meta-level classification used nationally, the issues voiced by Bihar's farmers during KBA outreach were grouped into twelve broad thematic clusters. At the core were soil health and fertility management and fertilizer and balanced nutrient use (NPK, INM), reflecting the campaign's central focus, alongside water management, covering waterlogging, flood, and irrigation concerns.

Closely linked to these were climate variability and weather-induced stress, seeds and improved varieties, and plant protection and pest/disease management — issues that farmers frequently raised in connection with declining input efficiency and unpredictable growing conditions.

A third set of concerns centred on farm operations and allied enterprises: farm machinery and implements, livestock and dairy production, and horticulture, particularly litchi, mango, and vegetable cultivation, which are significant income sources for Bihar's farmers.

Rounding out the classification were post-harvest handling, storage, and value addition; institutional, credit, and policy issues; and a residual category of miscellaneous and socio-economic issues that did not fit neatly into the other clusters but still bore on farmers' overall livelihoods.

Questions used for RBQ development

1. Soil-test-based fertilizer and nutrient management [मृदा परीक्षण आधारित उर्वरक एवं पोषक तत्व प्रबंधन पर अनुसंधान].

2. Improvement of soil organic carbon and biological health [मृदा जैविक कार्बन, संरचना एवं जैविक स्वास्थ्य सुधार पर अनुसंधान].
3. Management of sulphur, zinc, boron and other micronutrient deficiencies [सल्फर, जिंक, बोरॉन एवं अन्य सूक्ष्म पोषक तत्वों की कमी के प्रबंधन पर अनुसंधान].
4. Post-flood soil testing and recommendations for crop choice, sowing time and fertilizer use [बाढ़ के बाद मृदा स्वास्थ्य के आधार पर उपयुक्त फसल, बुआई समय एवं उर्वरक प्रबंधन की संस्तुति पर अनुसंधान].
5. Flood- and waterlogging - resilient crop-production technologies [बाढ़ एवं जल भराव सहनशील फसल उत्पादन तकनीकों पर अनुसंधान].
6. Management of delayed monsoon, drought, heat and irregular rainfall [विलंबित मानसून, सूखा, गर्मी एवं अनियमित वर्षा के अनुकूल कृषि तकनीकों पर अनुसंधान].
7. Crop diversification and utilization of rice-fallow and post-flood lands [फसल विविधीकरण तथा धान-परती एवं बाढ़ के बाद उपलब्ध भूमि के उपयोग पर अनुसंधान].
8. Improvement of zero tillage, DSR, crop residue management and farm mechanization [शून्य जुताई, धान की सीधी बुआई, फसल अवशेष प्रबंधन एवं कृषि यंत्रीकरण में सुधार पर अनुसंधान].
9. Identification of suitable climate- and stress-tolerant crop varieties [स्थानीय परिस्थितियों के अनुकूल जलवायु एवं तनाव-सहनशील किस्मों की पहचान पर अनुसंधान].
10. Integrated management of pests, diseases and weeds [कीट, रोग एवं खरपतवार के समेकित एवं पर्यावरण-अनुकूल प्रबंधन पर अनुसंधान].

Code	Researchable issue	Research focus
R1	Location-specific, soil-test-based nutrient management for major cropping systems	Optimization of N, P, K, S, micronutrients, organic manures and biofertilizers according to soil properties, crop requirement, yield target and farmers' resource availability.
R2	Restoration of soil organic carbon, soil structure and biological health	Evaluation of FYM, compost, crop-residue retention, green manuring, summer mungbean, Azolla, biofertilizers and reduced tillage for restoring soil health and sustaining crop productivity.
R3	Diagnosis and management of secondary- and micronutrient deficiencies in calcareous alluvial soils	Village- and block-level assessment of S, Zn, B, Fe, Mn and Cu deficiencies and development of crop-specific correction measures, application rates and placement methods.
R4	Post-flood assessment of soil health and development of suitable crop,	Assessment of sediment deposition, soil moisture, nutrient loss or enrichment, pH, salinity, soil compaction and

	sowing-time and recommendations	fertilizer	biological activity after flooding; identification of suitable crops, varieties, sowing windows and revised fertilizer doses for post-flood cultivation.
R5	Development of flood- and waterlogging-resilient production technologies	and crop-	Evaluation of flood-tolerant and short-duration varieties, drainage systems, raised beds, raised-sunken-bed systems, crop-fish integration and contingency practices for low-lying and waterlogged areas.
R6	Climate-resilient crop establishment and water-management practices under delayed monsoon, drought and heat stress		Refinement of direct-seeded rice, zero-till wheat, irrigation scheduling, moisture conservation, alternate wetting and drying, short-duration cultivars and contingency crop planning.
R7	Crop diversification and productive utilization of rice-fallow and post-flood lands		Evaluation of mungbean, lentil, chickpea, mustard, maize, fodder, vegetables and green-manure crops according to residual soil moisture, post-flood soil condition, available growing period and market suitability.
R8	Assessment and refinement of conservation agriculture and farm mechanization practices		Long-term effects of zero tillage, residue retention, DSR, laser land levelling, raised-bed planting and repeated rotavator use on soil compaction, soil moisture, weed dynamics, yield, energy use and profitability.
R9	Participatory identification of location-specific, climate- and stress-tolerant crop varieties		Evaluation of short-duration, flood-, waterlogging-, drought-, heat-, lodging-, pest- and disease-tolerant varieties under farmers' field conditions.
R10	Development of integrated, ecologically safer management strategies for major pests, diseases and weeds		Integration of resistant varieties, biological control, botanicals, cultural practices, pest surveillance, forecasting and need-based pesticide application for reducing crop losses and pesticide dependence.



Prioritization of Researchable Issues Identified under Khet Bachao Abhiyaan

The Rank-Based Quotient (RBQ) analysis consolidated the agricultural problems identified through KBA interactions in East Champaran, West Champaran, Sheohar and Patna into ten researchable issues. A total sample of 150 farmers was considered, and each farmer was assumed to rank all ten issues from the most urgent to the

least urgent. The resulting RBQ values ranged from 34.07 to 81.13%, indicating substantial differentiation among farmers' perceived research needs.

The prioritization is particularly relevant to Bihar because agriculture is dominated by very small operational holdings: the latest published state-level breakdown from the Agriculture Census 2015–16 reported that 91.21% of Bihar's

operational holders were marginal farmers with less than one hectare and another 5.75% were small farmers with one to two hectares. Technologies developed for the state must therefore be low-cost, divisible, risk-reducing and suitable for fragmented fields rather than

dependent on large capital investments. Bihar nevertheless produced 200.43 lakh tonnes of food grains in 2023–24, demonstrating both the importance of the sector and the scale at which improvements in soil, nutrient and climate management could generate benefits.

Priority rank	Code	Researchable issue	Weighted score	RBQ (%)
1	R1	Location-specific, soil-test-based nutrient management for major cropping systems	1,217	81.13
2	R4	Post-flood soil-health assessment and crop, sowing-time and fertilizer recommendations	1,149	76.60
3	R2	Restoration of soil organic carbon, soil structure and biological health	907	60.47
4	R5	Flood- and waterlogging-resilient crop-production technologies	902	60.13
5	R3	Diagnosis and management of secondary- and micronutrient deficiencies	826	55.07
6	R6	Climate-resilient crop establishment and water management under delayed monsoon, drought and heat	721	48.07
7	R7	Crop diversification and productive utilization of rice-fallow and post-flood land	707	47.13
8	R9	Identification of location-specific climate- and stress-tolerant crop varieties	699	46.60
9	R10	Integrated and ecologically safer management of pests, diseases and weeds	611	40.73
10	R8	Refinement of conservation-agriculture and farm-mechanization practices	511	34.07

Location-specific, soil-test-based nutrient management for major cropping systems emerged as the foremost research priority, obtaining an RBQ of 81.13%. This result indicates that farmers require more than general recommendations for rice, wheat, maize, sugarcane, pulses, vegetables and orchards. Research is needed to determine the optimum rate, source, placement and timing of nitrogen, phosphorus, potassium, sulphur and micronutrients according to soil properties, crop sequence, sowing date, water regime and attainable yield. The ranking is supported by the fertilizer-use situation in Bihar. Official data reported a state N:P:K consumption ratio of 11.0:3.3:1 in 2024–25, compared with 13.5:4.3:1 in 2023–24 and 14.4:4.5:1 in 2022–23. Although the Government has clarified that no single N:P:K ratio is ideal for every crop and soil, these values indicate continued nitrogen dominance and the need for soil-test-based, balanced application.

The Soil Health Card programme has already issued more than 1.54 crore cards in Bihar, but the priority now is to convert soil-test information into experimentally validated, crop- and location-specific prescriptions that farmers can implement.

The second-ranked research issue, with an RBQ of 76.60%, was the assessment of post-flood soil health and the development of suitable crop, sowing-time and fertilizer recommendations. This priority is justified by Bihar's structural exposure to flooding. The state Flood Management Information System identifies approximately 68,800 km² out of Bihar's total geographical area of 94,163 km², about 73.06%: as flood-prone and lists 28 flood-prone districts. East Champaran and Sheohar were included in the first-phase priority area of the state's Flood Management Information System, while Patna was included in its subsequent expansion. The official river-basin account also describes recurrent flooding and drainage problems in East

Champan and West Champan associated with the Gandak and BurhiGandak systems.

These conditions make a uniform post-flood recommendation scientifically inappropriate because flood duration, sediment deposition, erosion, soil moisture, drainage, nutrient redistribution and the date of flood recession differ among fields and years. Research under this second priority should quantify changes in soil pH, electrical conductivity, organic carbon, mineral nitrogen, available phosphorus, potassium, sulphur, zinc and boron immediately after floodwater recession. The work should classify fields according to inundation duration, sediment depth, residual moisture, trafficability and the remaining length of the growing season. Crop and varietal recommendations should then be linked to the earliest feasible sowing window.

For example, separate packages may be required for fields becoming available in September, October, November or later.

Short-duration rice, maize, lentil, chickpea, field pea, mustard, green gram, black gram, fodder crops and vegetables should be compared for establishment, yield stability, profitability and risk. Fertilizer experiments should examine whether conventional basal application remains appropriate in wet post-flood soils or whether reduced basal doses, split nitrogen, foliar feeding, seed priming or placement of phosphorus and micronutrients provides better recovery. The final output should be a decision matrix linking post-flood soil condition and recession date with crop choice, variety, sowing method, seed rate and fertilizer schedule.



Restoration of soil organic carbon, soil physical condition and biological health ranked third, with an RBQ of 60.47%. The importance of this issue was also evident during the KBA in East Champan, West Champan and Sheohar, where farmers were sensitized about green manuring, summer green gram, Azolla, crop-residue recycling, farmyard manure, biofertilizers and reduced dependence on chemical fertilizers.

Research should compare feasible combinations of FYM, compost, vermicompost, Dhaincha, pulse residues, cereal-residue retention and reduced tillage rather than evaluate each component in isolation. Measurements should extend beyond crop yield to soil organic carbon, bulk density, aggregate stability, infiltration, water-holding capacity, microbial

biomass, enzyme activity, nutrient-use efficiency and economic returns. Because most farmers operate marginal holdings, treatments must also be assessed for labour requirement, biomass availability, opportunity cost and compatibility with existing crop calendars.

Flood- and waterlogging-resilient crop-production technologies ranked fourth, recording an RBQ of 60.13%. This issue differs from post-flood crop planning because it concerns measures that reduce crop damage during inundation and waterlogging. Research should evaluate submergence-tolerant and short-duration rice varieties, waterlogging-tolerant maize and pulses, community drainage, field levelling, raised-bed planting, raised-sunken-bed systems, staggered nurseries and crop-fish integration.

The duration and depth of waterlogging that different crops can tolerate should be quantified so that farmers can decide whether to retain, rehabilitate or replace an affected crop. This priority is consistent with the VKSA research agenda for Bihar, which specifically identified the need for short-duration flood- and drought-tolerant rice and pulse varieties, multi-stress-tolerant crops, and short-duration lodging-resistant paddy for rainfed and flood-prone environments.

Diagnosis and correction of secondary- and micronutrient deficiencies ranked fifth, with an RBQ of 55.07%. This issue is closely connected with soil-test-based nutrient management but requires separate attention because deficiencies may vary sharply over short distances in alluvial and calcareous landscapes. The Government's Soil and Land Use Survey has identified zinc deficiency as a major concern in Bihar, while ICAR also recognizes sulphur, boron and zinc deficiencies, along with salinity, alkalinity and imperfect drainage, as important soil constraints in the state. Research should therefore generate village-level fertility maps and establish critical limits and crop-response functions for sulphur, zinc, boron and, where relevant, iron. Soil application, foliar application, seed treatment, root dipping, nutrient-enriched organic manure and fortified fertilizers should be compared. The Soil Health Card framework already covers pH, EC,

organic carbon, N, P, K, S, Zn, Fe, Cu, Mn and B; the research gap lies in translating these measurements into reliable local response probabilities and economically justified recommendations.

Climate-resilient crop establishment and water management ranked sixth, with an RBQ of 48.07%, followed by crop diversification and productive use of rice-fallow and post-flood land, with an RBQ of 47.13%. The VKSA diagnostic matrix for Bihar placed climate-change impacts first, seeds and improved varieties second, fertilizer management third, water management fourth and farm machinery fifth among the principal problem domains. This provides an independent basis for evaluating direct-seeded rice, zero-till wheat, delayed-sowing options, alternate wetting and drying, moisture conservation, laser land levelling, supplemental irrigation and weather-based crop advisories. Diversification research should compare lentil, chickpea, mustard, green gram, black gram, fodder and vegetables under different residual-moisture and sowing-window conditions. Relay sowing, paira cropping and zero-till establishment should be examined as methods for utilizing short post-rice windows. The emphasis should be on system productivity, profitability, soil fertility, irrigation requirement and income stability rather than yield of an individual crop alone.



Participatory identification of climate- and stress-tolerant varieties ranked eighth with an RBQ of 46.60%, integrated management of pests, diseases and weeds ranked ninth with 40.73%, and refinement of conservation-agriculture and mechanization practices ranked tenth with 34.07%. The relatively lower rankings do not indicate that these areas are unimportant; rather, farmers assigned greater immediate urgency to fertilizer, soil-health and flood-related issues. Varietal research should test short-duration, flood-, drought, heat-, lodging-, pest- and disease-tolerant materials under farmers' conditions instead of relying exclusively on research-station yields. VKSA specifically recommended yellow mosaic virus-resistant green gram, synchronous-maturing green gram and black gram, disease-resistant vegetables and multi-stress-tolerant crops for Bihar. Plant-protection research should integrate resistant varieties, field surveillance, biological control, botanicals, crop sanitation and threshold-based pesticide use. Mechanization research should examine zero tillage, DSR, residue management, raised beds, small machinery and custom hiring, while also assessing whether repeated shallow rotavator use contributes to subsurface compaction, restricted rooting and poor infiltration.

Overall, the ranking establishes a coherent research pathway in which soil-test-based nutrient management and post-flood decision support from the two central priorities. Soil organic matter restoration, flood resilience and micronutrient management constitute the next tier, while climate-resilient establishment, diversification, varietal improvement, integrated crop protection and appropriate mechanization provide supporting interventions. The principal implication is that the four districts should not receive a single blanket package. Research outputs should be stratified by district, flood exposure, land position, soil condition, crop system and sowing window. The intended products should include village-level soil fertility maps, validated fertilizer prescriptions, post-flood crop calendars, sowing-date-specific fertilizer

schedules, contingency crop options, soil-restoration modules and economically feasible technologies for marginal and small farmers. This demand-driven approach is consistent with KBA central recommendation that farmers' field problems be converted into state- and location-specific research priorities rather than addressed solely through generalized extension messages.

Key Field-Level Observations

- Widespread imbalance in N:P:K application relative to soil-test-based recommendations, with limited use of Soil Health Cards (SHCs) for real-time decision-making.
- Declining soil organic carbon (SOC) and micronutrient deficiencies (zinc, boron, sulphur) reported across the North Bihar alluvial and diara tracts.
- Water management constraints specific to waterlogging and post-flood soil recovery in the Kosi–Gandak–Bagmati basin districts.
- Weak last-mile linkage between soil-testing laboratories, KVKs, and farmers for translating test results into field-level fertilizer decisions.
- Limited local availability of quality biofertilizers, biopesticides, and organic manure at scale, constraining adoption of INM practices.
- Climate variability affecting the rabi–kharif transition, with farmers seeking location-specific, climate-resilient nutrient and cropping advisories.

Implications for Research, Extension and Policy:

The pattern of issues identified under KBA in Bihar underscores the need for a two-tiered response: state-wide strengthening of soil-test-based fertilizer recommendation systems and Soil Health Card utilisation, combined with zone-specific interventions for waterlogged North Bihar and drought-prone South Bihar.

These findings from the evidence base for the researchable priorities identified in the following chapter and are intended to guide ICAR institutes, Agricultural Universities, and the state KVK system in aligning future demand-driven research, unified agro-advisories, and policy engagement with farmers' actual field-level realities.





RESEARCHABLE ISSUES IDENTIFIED UNDER KBA



KBA-2026 translated farmer feedback gathered into a structured set of researchable issues intended to guide demand-driven scientific inquiry by ICAR institutes, AUs, and the state KVK system. Building on the field-level observations documented in the preceding chapter, these issues centre on soil health restoration, balanced and site-specific nutrient management, and climate-resilient production systems suited to Bihar's distinct agro-ecological zones — while also carrying forward priority crop- and livestock-related issues identified for the state under the earlier VKSA exercise. These researchable priorities are intended as a strategic input for ICAR institutes, AUs, and other National Agricultural Research and Extension System (NARES) institutions in Bihar, with KVKs playing the pivotal bridging role of validating solutions under local conditions and feeding continuous ground-level feedback into the research pipeline.

Soil Health and Nutrient Management

- Development and validation of site-specific, soil-test-based INM-modules for major cropping systems (rice-wheat, maize-based, vegetables and litchi/mango orchards).
- Assessment of the extent and causes of imbalanced N:P:K use across Bihar's agro-climatic zones and design of extension protocols to improve Soil Health Card adoption at farm level.
- Diagnosis and correction of secondary and micronutrient (zinc, boron, sulphur) deficiencies in the alluvial and diara soils of North Bihar.
- Design and validation of low-cost, mobile equipment for on-farm rapid quality testing of fertilizers to check input authenticity and reduce adulteration.
- Development of scalable local production and supply models for biofertilizers, biopesticides, and organic/green manures to support INM adoption.
- Evaluation of long-term impact of chemical-fertilizer-intensive cropping on soil organic carbon and microbial health.

Water Management and Climate Resilience

- Design and validation of community-based drainage and soil-reclamation techniques for waterlogged and flood-prone tracts of North Bihar.
- Development of multi-stress-tolerant (drought, flood, heat) crop varieties suited to Bihar's changing climate scenarios.
- Development of short-duration, flood- and drought-tolerant rice and pulse varieties for stress-prone ecologies of Bihar.
- Assessment of climate-resilient nutrient management practices for the rabi-kharif transition under variable rainfall patterns.

Crop- and Livestock-Specific Priorities

- Development of Site-Specific Climate-Resilient Integrated Farming System (IFS) Models for Diverse Agro-Ecological Situations of Bihar through Nature-Based Solutions, Precision Resource Management, and Digital Decision Support
- Post-harvest treatment and packaging technologies to extend shelf life and marketability of litchi grown in Bihar.
- Evaluation and promotion of high-yielding, disease-resistant tomato and vegetable varieties suited to Bihar's diverse agro-climatic conditions.
- Breeding and agronomic evaluation of climate-resilient, off-season mango varieties and nutrient-management practices for Bihar's orchards.
- Genetic improvement and agronomic optimisation of traditional Marcha paddy for higher yield and grain quality.

- Surveillance and management protocols for Disease in cattle under Bihar's farming systems.

Way Forward:

These researchable issues are proposed for validation through on-farm trials (OFTs), frontline demonstrations (FLDs), and continuous farmer engagement by ICAR institutes, AUs, and KVK network, in coordination with the Department of Agriculture, Government of Bihar. Their systematic pursuit is expected to strengthen the Lab-to-Land continuum begun under KBA, ensuring that future soil-health and nutrient-management research remains anchored in the real, location-specific priorities of Bihar's farming communities





GOVERNMENT SCHEMES SUPPORTING CLIMATE-RESILIENT AGRICULTURE AND SOIL HEALTH RESTORATIONS



Agriculture in India is undergoing a rapid transformation to address the challenges of climate change, declining soil fertility, water scarcity, rising production costs, and market uncertainties. To support this transition, the Government of India has launched several flagship programmes aimed at improving farmers' income, restoring soil health, promoting climate-resilient agriculture, strengthening post-harvest infrastructure, and encouraging sustainable farming practices. These initiatives complement the objectives of the Khet Bachao Abhiyan (KBA) by facilitating the adoption of scientific, resource-efficient, and environmentally sustainable agricultural technologies.

The Khet Bachao Abhiyan serves as a bridge between scientific innovations developed by ICAR and government support programmes, enabling farmers to adopt soil test-based nutrient management, Natural Farming, Nature-Based Solutions (NbS), conservation agriculture, Integrated Farming Systems (IFS), precision agriculture, and climate-smart technologies. This

chapter provides an overview of the major schemes that farmers can utilize for sustainable agricultural development.

SEHAT (Science Excellence for Health through Agricultural Transformation): Integrates agriculture, nutrition and health through biofortified crops, Integrated Farming Systems and One Health approaches.

Pradhan Mantri Kisan Samman Nidhi (PM-KISAN): Direct income support through DBT for purchasing quality agricultural inputs.

PM Kisan Maandhan Yojana (PM-KMY): Monthly pension for eligible small and marginal farmers after 60 years of age.

Modified Interest Subvention Scheme (MISS): Low-interest crop loans through Kisan Credit Card (KCC).

Kisan Credit Card (KCC): Institutional credit for crops, livestock, fisheries and allied enterprises.

Pradhan Mantri Fasal Bima Yojana (PMFBY): Insurance against crop losses due to natural calamities.

Soil Health Card (SHC) Scheme: Soil testing and soil test-based fertilizer recommendations for balanced nutrient management.

PM-PRANAM: Promotes balanced fertilizer use and reduces excessive chemical fertilizer consumption

National Mission on Natural Farming (NMNF): Promotes chemical-free farming using on-farm biological inputs.

Paramparagat Krishi Vikas Yojana (PKVY): Supports cluster-based organic farming and certification.

Pradhanmantri Krishi Sinchayee Yojana (PMKSY): Improves irrigation efficiency through water harvesting and micro-irrigation.

Per Drop More Crop (PDMC): Promotes drip and sprinkler irrigation for higher water-use efficiency.

Rainfed Area Development (RAD): Supports Integrated Farming Systems in rainfed regions.

Sub-Mission on Agricultural Mechanization (SMAM): Promotes farm mechanization including zero tillage, Happy Seeder, drones and Custom Hiring Centres.

Crop Residue Management (CRM): Supports in-situ residue management and discourages residue burning.

Agriculture Infrastructure Fund (AIF): Financial support for warehouses, cold storage, grading and processing units.

Formation & Promotion of 10,000 FPOs: Supports Farmer Producer Organizations for aggregation, value addition and marketing.

Integrated Scheme for Agricultural Marketing (ISAM)/e-NAM: Provides electronic marketing platform and transparent price discovery.

National Food Security Mission (NFSM): Enhances productivity of rice, wheat, pulses, maize and millets.

Sub-Mission on Seed and Planting Material (SMSP): Ensures availability of quality seeds and planting materials.

Mission for Integrated Development of Horticulture (MIDH): Supports orchards, vegetables, nurseries, protected cultivation and post-harvest management.

National Bamboo Mission (NBM): Promotes bamboo cultivation, processing and value addition.

National Livestock Mission (NLM): Supports livestock development, fodder production and breed improvement.

Pradhan Mantri Matsya Sampada Yojana (PMMSY): Promotes scientific fisheries and fish-based Integrated Farming Systems.

National Beekeeping and Honey Mission (NBHM): Supports scientific beekeeping and honey production.

PMAASHA: Ensures remunerative prices for pulses, oilseeds and copra through MSP support.

Rashtriya Krishi Vikas Yojana (PM-RKVY): Supports state-specific agricultural development projects and innovation.

Krishonnati Yojana: Umbrella programme for food security, productivity enhancement and sustainable agriculture.

Scheduled Caste Sub-Plan (SCSP): Provides quality seed, saplings, farm tools, demonstrations and training for Scheduled Caste farmers.

Tribal Sub-Plan (TSP): Supports Scheduled Tribe farmers through technology dissemination, agricultural inputs and capacity building.

Digital Agriculture Mission (AgriStack): Digital farmer database, soil mapping, crop survey and precision agriculture.

Bharat-VISTAAR: AI-enabled multilingual agricultural advisory and scheme information platform.

Namo Drone Didi: Supports Women SHGs with agricultural drones for precision farming services.

Mission for Aatmanirbharta in Pulses: Promotes self-sufficiency in pulse production through MSP support, seed and technology.

National Mission on High Yielding Seeds: Promotes climate-resilient and biofortified crop varieties.

Prime Minister Dhan-Dhaanya Krishi Yojana (PM-DDKY): Converges district-level interventions to improve productivity, storage and rural infrastructure.

National Gene Bank for Crop Germplasm: Conserves plant genetic resources for future crop improvement and climate resilience.

Integration of Government Schemes with Khet Bachao Abhiyan: The success of the Khet Bachao Abhiyan depends on effectively linking scientific knowledge with government support programmes. The campaign promotes soil testing, balanced nutrient management, green manuring, Integrated Farming Systems, Natural Farming, Nature-Based Solutions, conservation agriculture, crop diversification, precision resource management, and climate-smart technologies, while government schemes provide the financial, technical, and institutional support required for their large-scale adoption. Together, these initiatives contribute to restoring soil health, improving resource-use efficiency, increasing farmers' income, strengthening food and nutritional security, and achieving the national vision of Viksit Bharat @2047.

Key Messages

- Test Before You Invest—always base fertilizer application on soil test recommendations.
- Utilize Soil Health Cards for balanced nutrient management.
- Integrate organic manures, green manuring, biofertilizers, and chemical fertilizers following the 4R Nutrient Stewardship principles.
- Adopt Integrated Farming Systems (IFS) to diversify income and improve resource recycling.

- Promote Natural Farming and Nature-Based Solutions (NbS) wherever feasible.
- Avoid crop residue burning and adopt conservation agriculture practices.
- Utilize government schemes to access quality inputs, farm mechanization, irrigation, insurance, post-harvest infrastructure, and market opportunities.
- Strengthen farmer collectives through FPOs and make use of digital agricultural services for timely information and decision-making.

Summary

Government schemes provide the financial, technical, and institutional support needed to transform Indian agriculture into a more productive, profitable, and climate-resilient sector. When combined with the science-based interventions promoted through the Khet Bachao Abhiyan, these programmes enable farmers to restore soil health, improve nutrient-use efficiency, conserve water, diversify farming systems, strengthen resilience to climate change, and enhance farm income. By effectively utilizing these schemes and adopting sustainable agricultural technologies, farmers can contribute to the realization of Viksit Bharat @2047 while ensuring long-term food, nutritional, and environmental security.





CONCLUSION AND FUTURE PERSPECTIVE



Over one month, ICAR-MGIFRI translated a national campaign mandate into 6,854 individual farmer conversations across four districts of Bihar. This closing chapter draws together what the campaign demonstrated, where farmers themselves identified gaps, and what a next phase of Khet Bachao Abhiyan could build on.

What the Campaign Demonstrated

Three things stand out across the chapters of this book. First, a single technical message — test before you invest — can be carried consistently across dozens of villages, formats and audiences (farmers, Panchayat leaders, fertilizer dealers, FPOs) without losing its clarity or urgency. Second, biological nitrogen sources, above all Dhaincha green manuring, gave the campaign a concrete, low-cost, farmer-adoptable technology to pair

with the abstract idea of "soil health" — the recurring 50-60 kg N ha⁻¹ figure, and farmers' own description of root nodules as a "natural urea factory," show how a scientific fact can travel and stick. Third, Integrated Farming Systems proved to be the right organizing idea for MGIFRI's flood-prone, waterlogged operating environment, where cereal-only advisories are structurally limited.

The scale of convergence is itself a result: four ICAR/RPCA-linked institutions, the state Department of Agriculture, ATMA, multiple KVKs, Panchayati Raj institutions and 14 FPOs worked inside a single monthly campaign calendar — evidence that the extension architecture needed for soil-health transformation already exists in Bihar and can be activated at speed.



Gaps the Farmers Themselves Identified

The feedback gathered is the most reliable guide to what should change next. Farmers named a specific bottleneck repeatedly: the timely availability of quality Dhaincha seed. A green-manuring campaign built on a message farmers clearly want to adopt will only convert into field-level area under Dhaincha if seed supply chains are strengthened before the next sowing window, not during it.

Women farmers, who made up just over a quarter of total participants, asked for something the campaign's current IFS models do not yet fully offer: small-scale, household-level IFS designs and drudgery-reducing tools, rather than the larger fish-pond or multi-enterprise models presented in most demonstrations. And farmers across villages continued to ask for more soil testing capacity and more frequent field demonstrations — a signal that one round of awareness, however well received, needs to be followed by sustained, closer-to-farm technical support.

Recommendations for Khet Bachao Abhiyan 2027

Building on the campaign's own evidence, four priorities emerge for the next cycle. First, secure Dhaincha and green-manure seed supply well ahead of the June sowing window, potentially through seed production plots at ICAR-MGIFRI and KVKs, so that farmer interest translates into adoption rather than waiting lists. Second, design and demonstrate small-scale, women-led IFS

models — kitchen-garden-scale horticulture, backyard poultry, and household-level composting — alongside the larger fish- and goat-based systems already being showcased. Third, expand soil testing infrastructure and turnaround time, since "test before you invest" as a message is only as strong as farmers' actual ability to get a soil test done and acted upon within a cropping season. Fourth, formalize the fertilizer-dealer certification pathway piloted at KVK Piprakothi so that dealers become a standing, campaign-independent channel for soil-test-based advice throughout the year, not only during the June outreach window.

The exposure-visit model — taking farmers to see IFS and green-manuring in practice at sites such as Naubatpur, Patna, and within MGIFRI's own demonstration units — was among the most consistently well-received formats in this campaign and deserves to be scaled, particularly for the women farmers and FPO representatives who asked for more direct, hands-on learning.

Closing Note

Khet Bachao Abhiyan-2026 in Bihar was, in the words of its own campaign reporting, framed as a "people's movement." The events documented in this book — from a Kisan Chaupal of 52 farmers at Madhopur to a mega conference of 4,238 farmers at Piprakothi, from a Mukhiya Sammelan of Panchayat leaders to a certification course for fertilizer dealers, from mango orchards to fish ponds — together make the case that soil

health, usually treated as a slow, invisible process, can be made immediate, visible, and shared. The task now is to keep the same institutional machinery running between campaigns, so that testing before investing becomes not a June message, but a standing habit of Bihar's farming year.





FROM THE NEWSROOM: KHET BACHAO ABHIYAN

National Outreach, Scientific Milestones and Media Highlights



Highlights of Khet Bachao Abhiyan–2026 During the month-long Khet Bachao Abhiyan–2026, ICAR–MGIFRI, Motihari, implemented an intensive science-led outreach programme across Bihar in collaboration with Krishi Vigyan Kendras (KVKs), the Department of Agriculture, ATMA, RPCAU, Panchayati Raj Institutions, Farmer Producer Organizations (FPOs), and other stakeholders. The campaign generated

widespread national visibility through the ICAR News Portal, documenting field demonstrations, farmer-scientist interactions, integrated farming systems, soil health restoration, natural farming, climate-resilient agriculture, and capacity-building initiatives. Presented below is a chronological compilation of 34 official ICAR News reports, reflecting the scale, diversity, and impact of the campaign.

S. No.	Details	Web link
1.	ICAR-MGIFRI, Motihari and KVK Madhopur Lead Soil Health Awareness Drive under Khet Bachao Abhiyan in West Champaran, Bihar	https://icar.org.in/en/icar-mgifri-motihari-and-kvk-madhopur-lead-soil-health-awareness-drive-under-khet-bachao-abhiyan
2.	Khet Bachao Abhiyan Gains Momentum in Bihar, 550 Farmers Participate in Mega ICAR Workshop	https://icar.org.in/en/khet-bachao-abhiyan-gains-momentum-bihar-550-farmers-participate-mega-icar-workshop
3.	Farmers learn climate-smart farming practices under Khet Bachao Abhiyan at ICAR-MGIFRI, Motihari, Bihar	https://icar.org.in/en/farmers-learn-climate-smart-farming-practices-under-khet-bachao-abhiyan-icar-mgifri-motihari-bihar
4.	ICAR and RPCAU Organizes Mega Farmer Outreach Programme on Natural Farming	https://icar.org.in/en/icar-and-rpcau-organizes-mega-farmer-outreach-programme-natural-farming-and-soil-

	and Soil Health under Khet Bachao Abhiyan 2026	health-under-khet
5.	ICAR-MGIFRI, Motihari, Engages Panchayat Leaders under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-engages-panchayat-leaders-under-khet-bachao-abhiyan-bihar
6.	ICAR-MGIFRI, Bihar Promotes integrated farming systems and soil health under Farmer FIRST and Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-bihar-promotes-integrated-farming-systems-and-soil-health-under-farmer-first-and-khet
7.	ICAR-MGIFRI, Motihari Integrates SCSP Support with Khet Bachao Abhiyan to Promote Soil Health in Bihar	https://icar.org.in/en/icar-mgifri-motihari-integrates-scsp-support-khet-bachao-abhiyan-promote-soil-health-bihar
8.	ICAR-MGIFRI, Motihari and KVK Sheohar promote soil health and integrated farming systems under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-and-kvk-sheohar-promote-soil-health-and-integrated-farming-systems-under-khet
9.	ICAR-MGIFRI, Motihari and Bihar Agriculture Department Promote Balanced Fertilizer Use under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-and-bihar-agriculture-department-promote-balanced-fertilizer-use-under-khet
10.	Farmer FIRST Village Embraces Soil Health and Climate-Smart Farming under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/farmer-first-village-embraces-soil-health-and-climate-smart-farming-under-khet-bachao-abhiyan-bihar
11.	PM-KISAN Utsav Diwas Celebrated Across ICAR Institutes Pan India	https://icar.org.in/en/pm-kisan-utsav-diwas-celebrated-across-icar-institutes-pan-india
12.	ICAR-MGIFRI, Motihari Empowers Farmers through SCSP Support and Integrated Farming Systems Awareness under Khet Bachao Abhiyan	https://icar.org.in/en/icar-mgifri-motihari-empowers-farmers-through-scsp-support-and-integrated-farming-systems-awareness
13.	ICAR-MGIFRI, Motihari and KVK Piprakothi strengthen fertilizer dealers' capacity on integrated nutrient management under Khet Bachao Abhiyan	https://icar.org.in/en/icar-mgifri-motihari-and-kvk-piprakothi-strengthen-fertilizer-dealers-capacity-integrated-nutrient
14.	ICAR-MGIFRI, Motihari promotes balanced fertilizer use and climate-resilient farming under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-promotes-balanced-fertilizer-use-and-climate-resilient-farming-under-khet
15.	ICAR-MGIFRI, Motihari Advances Scientific Nutrient Management in Litchi Cultivation	https://icar.org.in/en/icar-mgifri-motihari-advances-scientific-nutrient-management-litchi-cultivation
16.	ICAR-MGIFRI, Motihari and ATMA join hands to promote balanced fertilizer under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-and-atma-join-hands-promote-balanced-fertilizer-under-khet-bachao-abhiyan
17.	Farmers Learn Nature-Based Solutions for Climate-Resilient Agriculture under Khet Bachao Abhiyan at ICAR-MGIFRI, Motihari	https://icar.org.in/en/farmers-learn-nature-based-solutions-climate-resilient-agriculture-under-khet-bachao-abhiyan-icar
18.	ICAR-MGIFRI, KVK Parsauni and ATMA Join Hands to Strengthen Soil Health and Integrated Farming under Khet Bachao Abhiyan	https://icar.org.in/en/icar-mgifri-kvk-parsauni-and-atma-join-hands-strengthen-soil-health-and-integrated-farming-under
19.	Joint efforts of ICAR-MGIFRI, Motihari and KVK Madhopur promote soil health and integrated farming systems under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/joint-efforts-icar-mgifri-motihari-and-kvk-madhopur-promote-soil-health-and-integrated-farming

20.	Green manuring and balanced fertilization gain momentum under Khet Bachao Abhiyan in Bihar at ICAR-MGIFRI, Motihari	https://icar.org.in/en/green-manuring-and-balanced-fertilization-gain-momentum-under-khet-bachao-abhiyan-bihar-icar-mgifri
21.	ICAR-MGIFRI, Motihari and ATMA strengthen farmer awareness on soil health, rice nursery management and eco-friendly pest control under Khet Bachao Abhiyan	https://icar.org.in/en/icar-mgifri-motihari-and-atma-strengthen-farmer-awareness-soil-health-rice-nursery-management-and
22.	ICAR-MGIFRI, Motihari and ATMA Promote Integrated Farming Systems and Soil Health under Khet Bachao Abhiyan in Bihar	https://icar.org.in/en/icar-mgifri-motihari-and-atma-promote-integrated-farming-systems-and-soil-health-under-khet-bachao
23.	Scientists and Gram Panchayat Leaders Unite under Khet Bachao Abhiyan to Promote Climate-Resilient Agriculture in Bihar	https://icar.org.in/en/scientists-and-gram-panchayat-leaders-unite-under-khet-bachao-abhiyan-promote-climate-resilient
24.	Farmer feedback highlights growing demand for integrated farming systems and soil-health-centered agriculture under Khet Bachao Abhiyan at ICAR-MGIFRI, Motihari	https://icar.org.in/en/farmer-feedback-highlights-growing-demand-integrated-farming-systems-and-soil-health-centered
25.	ICAR-MGIFRI, Motihari Takes Khet Bachao Abhiyan to India's Frontier Villages, Promotes Soil Health and Sustainable Farming	https://icar.org.in/en/icar-mgifri-motihari-takes-khet-bachao-abhiyan-indias-frontier-villages-promotes-soil-health-and
26.	ICAR-MGIFRI, Motihari organizes farmers' exposure visit under Khet Bachao Abhiyan to showcase integrated farming systems	https://icar.org.in/en/icar-mgifri-motihari-organizes-farmers-exposure-visit-under-khet-bachao-abhiyan-showcase-integrated
27.	ICAR-MGIFRI, Motihari Promotes Dhaincha-Based Soil Health Management under Khet Bachao Abhiyan	https://icar.org.in/en/icar-mgifri-motihari-promotes-dhaincha-based-soil-health-management-under-khet-bachao-abhiyan
28.	ICAR-MGIFRI, Motihari Advances Scientific Nutrient Management in Mango Orchards under Khet Bachao Abhiyan-2026	https://www.icar.org.in/en/icar-mgifri-motihari-advances-scientific-nutrient-management-mango-orchards-under-khet-bachao
29.	FPOs, Scientists and Progressive Farmers Unite at ICAR-MGIFRI, Motihari to Advance Soil Health and Sustainable Agribusiness under Khet Bachao Abhiyan-2026	https://www.icar.org.in/en/fpos-scientists-and-progressive-farmers-unite-icar-mgifri-motihari-advance-soil-health-and
30.	ICAR-MGIFRI, Motihari Promotes Soil Testing and Summer Mungbean for Healthy Soils under Khet Bachao Abhiyan-2026	https://www.icar.org.in/en/icar-mgifri-motihari-promotes-soil-testing-and-summer-mungbean-healthy-soils-under-khet-bachao
31.	ICAR-MGIFRI, Motihari Promotes Soil-Health-Centred Orchard Management under Khet Bachao Abhiyan-2026 in Bihar	https://www.icar.org.in/en/icar-mgifri-motihari-promotes-soil-health-centred-orchard-management-under-khet-bachao-abhiyan-2026
32.	ICAR-MGIFRI, Motihari Promotes Scientific Papaya Cultivation under Khet Bachao Abhiyan to Enhance Soil Health, Fruit Quality, and Farmers' Income	https://icar.org.in/en/icar-mgifri-motihari-promotes-scientific-papaya-cultivation-under-khet-bachao-abhiyan-enhance-soil
33.	Joint Efforts of ICAR-MGIFRI, Motihari and Bihar Agriculture Department Promote Fruit-Based Integrated Farming Systems under Khet Bachao Abhiyan	https://icar.org.in/en/joint-efforts-icar-mgifri-motihari-and-bihar-agriculture-department-promote-fruit-based-integrated
34.	ICAR-MGIFRI, Motihari reaches 6,854 farmers across four districts of Bihar through science-led soil health and climate-resilient agriculture under Khet Bachao Abhiyan-2026	https://icar.org.in/en/icar-mgifri-motihari-reaches-6854-farmers-across-four-districts-bihar-through-science-led-soil



ICAR-MGIFRI, MOTIHARI AND KVK MADHOPUR LEAD SOIL HEALTH AWARENESS DRIVE UNDER KHET BACHAO ABHIYAN IN WEST CHAMPARAN, BIHAR



मुख्य पृष्ठ / ICAR-MGIFRI, Motihari And KVK Madhopur Lead Soil Health Awareness Drive Under Khet Bachao Abhiyan In West Champaran, Bihar



ICAR-MGIFRI, Motihari and KVK Madhopur Lead Soil Health Awareness Drive under Khet Bachao Abhiyan in West Champaran, Bihar

12 June 2026, Motihari, Bihar

As part of the nationwide "Khet Bachao Abhiyan-2026", ICAR–Mahatma Gandhi Integrated Farming Research Institute, Motihari, in collaboration with Krishi Vigyan Kendra (KVK), Madhopur, West Champaran, organized a "Kisan Chaupal" and awareness-cum-training programme on soil health and balanced fertilizer use for farmers from different villages of West Champaran district. The programme was coordinated and facilitated by KVK Madhopur through extensive local outreach and farmer mobilization.



FARMER FIRST VILLAGE EMBRACES SOIL HEALTH AND CLIMATE-SMART FARMING UNDER KHET BACHAO ABHIYAN IN BIHAR



मुख्य पृष्ठ / Farmer FIRST Village Embraces Soil Health And Climate-Smart Farming Under Khet Bachao Abhiyan In Bihar



Farmer FIRST Village Embraces Soil Health and Climate-Smart Farming under Khet Bachao Abhiyan in Bihar

18 June 2026, Motihari, Bihar

As part of the nationwide Khet Bachao Abhiyan–2026, ICAR–Mahatma Gandhi Integrated Farming Research Institute, Motihari organized a farmer awareness and capacity-building programme at Ujhilpur village, Tetaria Block, East Champaran district, Bihar. The village is one of the adopted villages under the ICAR Farmer FIRST Programme, where scientists are working closely with farmers to promote sustainable, climate-resilient, and resource-efficient farming systems.



FARMER FEEDBACK HIGHLIGHTS GROWING DEMAND FOR INTEGRATED FARMING SYSTEMS AND SOIL-HEALTH-CENTERED AGRICULTURE UNDER KHET BACHAO ABHIYAN AT ICAR-MGIFRI, MOTIHARI



मुख्य पृष्ठ /



Farmer Feedback Highlights Growing Demand For Integrated Farming Systems And Soil-health-centered Agriculture Under Khet Bachao Abhiyan A...



Farmer feedback highlights growing demand for integrated farming systems and soil-health-centered agriculture under Khet Bachao Abhiyan at ICAR-MGIFRI, Motihari

24 June 2026, Motihari, Bihar

As part of the nationwide Khet Bachao Abhiyan–2026, ICAR–Mahatma Gandhi Integrated Farming Research Institute, Motihari organized a series of farmer awareness-cum-training programmes across several villages and blocks of East and West Champaran district, Bihar. The campaign focused on promoting Integrated Farming Systems (IFS), soil health restoration, balanced fertilizer use, green manuring, crop diversification, crop residue

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