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Global Agri Magazine

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Volume: 03
Issue: 04
May 2026

May 2026 | Special Edition

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Honoring Women Transforming the Future of Global Agriculture

CIFOR | World Agroforestry

Exclusive Interview

Dr. Sonya Dewi Santoso

Director of Asia, CIFOR-ICRAF

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KhetiValah
Global Agri Magazine
Volume : 3 | Issue 4 | May 2026

Founder's Note

Dear Readers,

As we present the May 2026 edition of KhetiValah Global Agri Magazine (e-magazine), we take immense pride in sharing a truly special edition dedicated to celebrating the invaluable role of women in agriculture and allied sectors across the globe.

This Mother's Day Special Edition is a tribute to the inspiring women researchers, scientists, educators, entrepreneurs, development professionals, nutrition experts, and changemakers whose work continues to shape stronger and more sustainable agri-food systems.

For the first time, we are honored to feature an edition where all articles, expert features, and knowledge contributions are exclusively authored by esteemed women contributors from across the world, reflecting diverse perspectives, expertise, and real-world experiences across the global agricultural ecosystem.

This month, we are privileged to feature Dr. Sonya Dewi Santoso, Director – Asia, CIFOR-ICRAF, as our Cover Story Interview, whose valuable insights on sustainable agriculture, resilient landscapes, and innovation-driven agricultural development significantly enrich this edition.

We sincerely thank Ms. Danielle Botti, Head of Global Outreach & Engagement at CIFOR-ICRAF, for her continued support and timely coordination, and Mr. Aris Sanjaya, Photo Video Coordinator at CIFOR-ICRAF, Indonesia, for his valuable assistance in supporting this meaningful interaction.

We are equally delighted to showcase inspiring contributions under our special features, including MilletCorner and KrishiYashas, where women experts share valuable perspectives on nutrition, agricultural education, global learning, professional growth, and future-ready opportunities in agriculture and allied sectors.

We also take this opportunity to warmly welcome Dr. Prof. Vivekananda D to the Editorial Team of KhetiValah Global Agri Magazine, and we look forward to strengthening our collective efforts in promoting meaningful agricultural knowledge exchange.

We extend our heartfelt gratitude to all our esteemed women contributors, readers, collaborators, and well-wishers whose continued support strengthens our mission of building a stronger, knowledge-driven agricultural ecosystem.

Join KhetiValah in its mission to build a "Wealthier and Healthier World." 🌍💚

Jai Bharat !

Regards,
Lakshman K
Founder & Chairman of KhetiValah

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INDIA MILLET INITIATIVE | GIRAS | International Decade of Millets 2024-34

MilletsCorner is a dedicated initiative of **KhetiValah Global Agri Magazine** focused on promoting millet-based knowledge, sustainable farming practices, nutrition awareness, value addition, and market opportunities.

Through this platform, we aim to connect farmers, researchers, institutions, and entrepreneurs to strengthen millet ecosystems and encourage climate-resilient agriculture, healthier food systems, and sustainable livelihoods.

Dt. Lavanya SR, MSc. F&N
Fellowship NHCA Singapore,
ADAN,IADSN,IAAND
Clinical Dietitian, Functional Medicine Practitioner
FOUNDER CHETHANYA'S - TRUE BOWL
Associate Director - India Millet Initiative -Hassan Chapter

MILLET 2.0

From Ancient Grains to Precision Nutrition Systems

Reimagining food as a metabolic system

About

Dt. Lavanya SR is a Clinical Dietician, Functional Nutrition Practitioner, Healthpreneur, and Food Technologist, and the Founder of Chethanya'S TrueBowl . With a Master's degree in Food Science and Nutrition and advanced training in Clinical, Functional, and Preventive nutrition, she specializes in therapeutic, food-based interventions for lifestyle and metabolic disorders.

Her work focuses on translating nutrition science into practical, sustainable systems by designing personalized meal frameworks rooted in functional medicine, gut health, and metabolic balance. She is also actively involved in millet-based innovations, therapeutic food formulation, and community nutrition initiatives.

Lavanya brings strong industry experience as a Food Technologist and Quality Assurance professional, with expertise in food safety, product development, and quality systems. Her certifications in HACCP and FSMS further strengthen her ability to integrate clinical nutrition with food technology for scalable, real-world solutions. She has received international training from NHCA, Singapore, and is a registered dietician under Nutrition Support Resource (NSR), India.

Beyond practice, she contributes as a speaker, educator, and nutrition resource person,working across schools, women's health programs, and farmer-focused initiatives. Her work integrates science, tradition, and practical application to promote preventive, sustainable health through food.

The Rise of Intelligent Grains
Relevance of Millets in Modern Nutrition

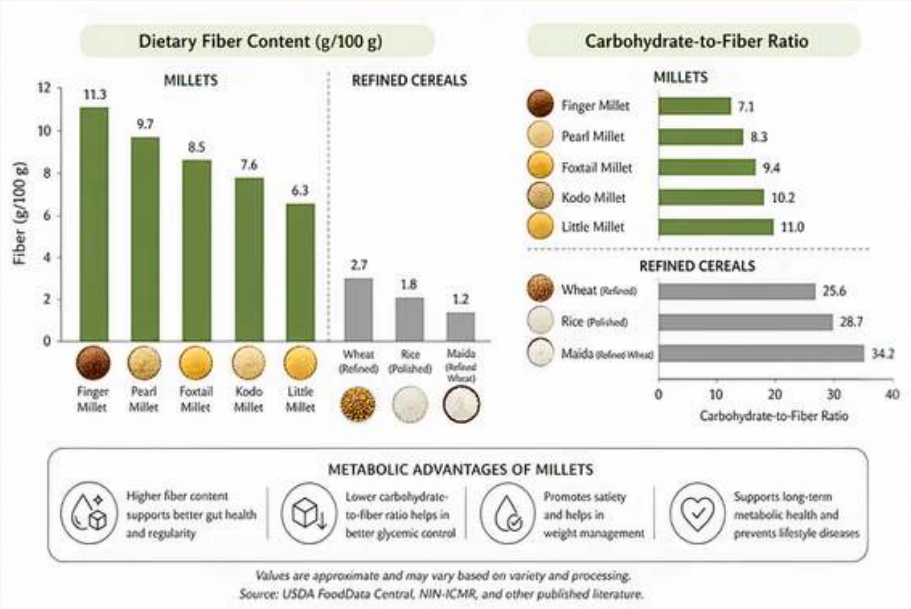
Millets have long been an integral component of India's agro-ecological and dietary heritage.
While their historical importance is well established, recent scientific advancements have renewed interest in their functional and therapeutic potential. Increasing prevalence of non-communicable diseases (NCDs), including diabetes, obesity, and cardiovascular disorders, has shifted the focus toward food systems that support metabolic health and disease prevention.

In this context, millets are being repositioned from traditional staples to strategic components of future nutrition systems, supported by national initiatives and growing global recognition.

Positioning of millets at the intersection of nutritional density and ecological resilience.

The Biochemical Advantage
How Millets Interact with the Human Body

This figure highlights the macronutrient architecture of millets compared to refined cereals,
with a specific focus on dietary fiber and protein distribution.
Millets such as browntop, little millet, and foxtail millet demonstrate



significantly higher dietary fiber content (up to ~12.5 g/100 g) compared to polished rice (~0.2 g/100 g).

This elevated fiber content contributes to:

Delayed gastric emptying
Reduced glucose diffusion in the intestine
Improved postprandial glycemic response

Additionally, the carbohydrate-to-fiber ratio is markedly lower in millets (≈5–8) compared to rice (~395), indicating a more metabolically favorable carbohydrate profile.

A lower ratio is strongly associated with:
Improved insulin sensitivity
Reduced glycemic load
Better long-term metabolic regulation

POLYPHENOLS & ANTIOXIDANT MECHANISMS

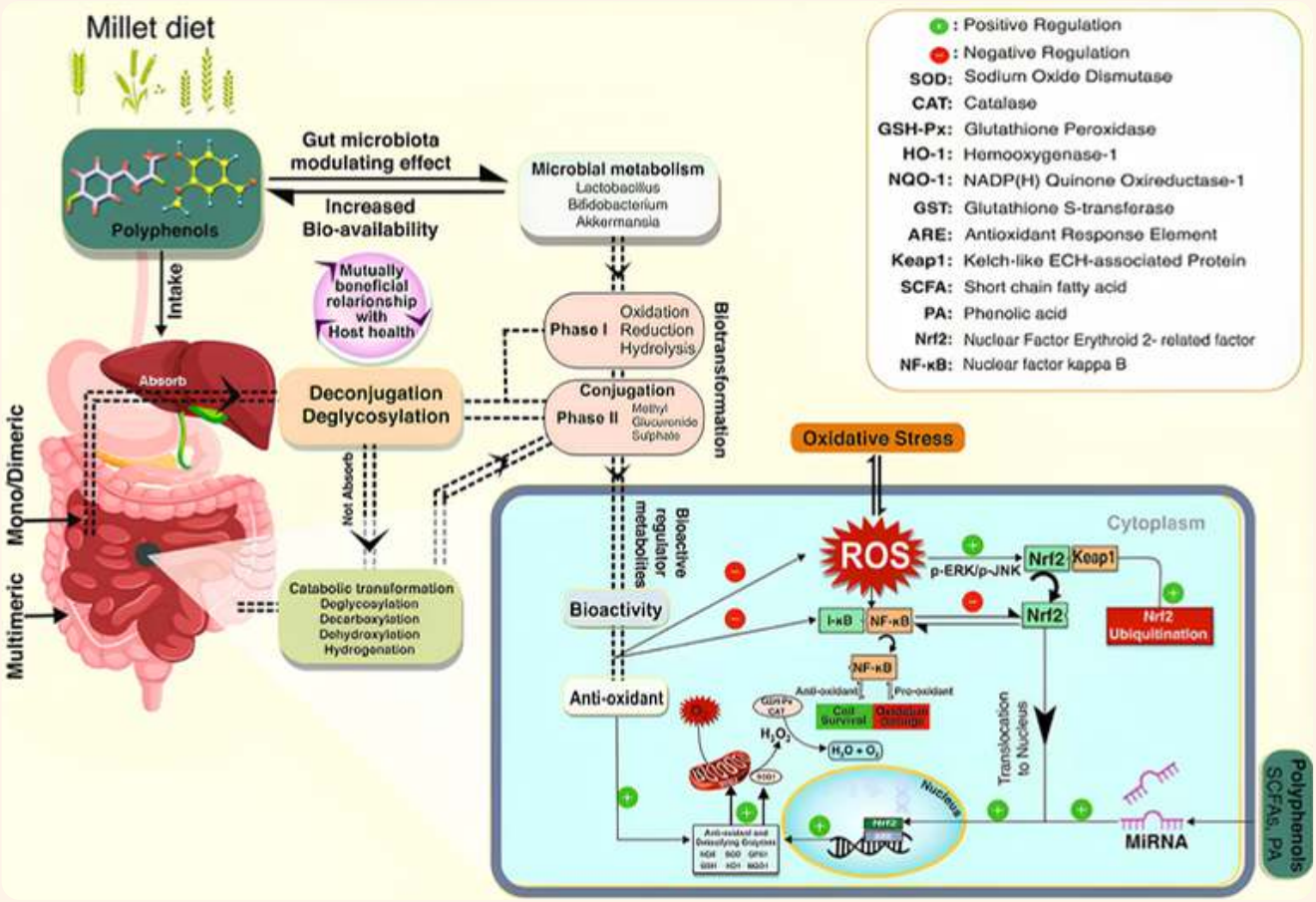


Figure 3: Biotransformation of millet-derived polyphenols and activation of antioxidant and anti-inflammatory pathways.

Millets are rich in phenolic compounds, including ferulic acid, catechins, and tannins, which are predominantly present in bound forms.

Following ingestion, these compounds undergo microbial transformation in the gut:

Phase 1: Microbial Biotransformation

Deconjugation and deglycosylation by gut microbiota .Increased bioavailability of phenolic metabolites.Enrichment of beneficial bacterial populations such as Lactobacillus and Bifidobacterium

Phase2:Cellular Antioxidant Activation

Bioactive metabolites activate intracellular pathways, including: Nuclear factor erythroid 2–related factor 2 (Nrf2), enhancing antioxidant enzyme expression Inhibition of nuclear factor kappa B (NF-κB), reducing inflammatory signaling These mechanisms result in decreased oxidative stress and improved cellular resilience (Chandrasekara & Shahidi, 2011; Devi et al., 2014).

GUT MICROBIOME MODULATION & SCFA PRODUCTION

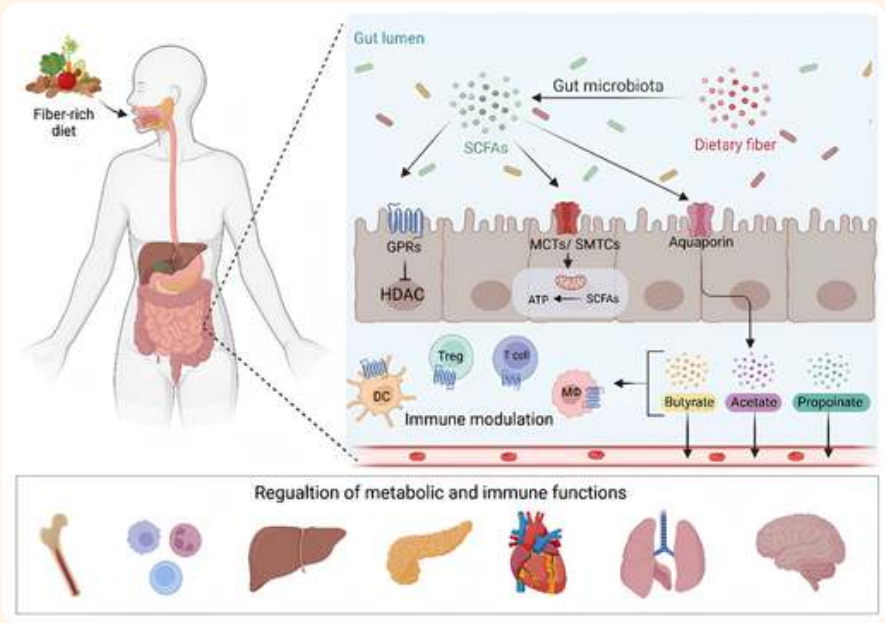


Figure 4: Prebiotic function of millet fiber leading to SCFA production and metabolic regulation.

Millet-derived dietary fiber functions as a prebiotic substrate. Upon reaching the colon, it undergoes fermentation by gut microbiota, producing short-chain fatty acids (SCFAs) such as butyrate, propionate, and acetate.

These metabolites exert multiple physiological effects:

- Enhancement of intestinal barrier integrity
- Regulation of glucose and lipid metabolism
- Modulation of immune responses via T-regulatory cells

SCFAs also interact with G-protein coupled receptors and influence histone deacetylase activity, contributing to improved metabolic homeostasis (Nature Reviews Gastroenterology & Hepatology).

TRANSLATING SCIENCE TO PLATE

Clinical & Lifestyle Integration – Bridging Nutritional Biochemistry with Everyday Food Systems

1. Designing the Millet-Based Meal Framework

To achieve optimal metabolic outcomes, millets should be integrated within a balanced nutritional matrix. Combining millets with complementary macronutrients enhances both physiological response and nutrient utilization.

- Proteins (pulses, legumes, eggs, dairy) support amino acid balance and satiety
- Healthy fats (nuts, seeds, cold-pressed oils) improve nutrient absorption and hormonal regulation
- Dietary fibre sources (vegetables and greens) further modulate glycemic response
-

This structured approach promotes slower glucose release, sustained energy levels, and improved metabolic stability.

2. Enhancing Functional Value Through Processing

Traditional processing methods play a critical role in unlocking the full nutritional potential of millets. Techniques such as soaking, fermentation, and sprouting significantly improve digestibility and bioavailability.

- Soaking reduces anti-nutritional factors and improves mineral accessibility
- Fermentation supports gut compatibility and enhances microbial interaction

- Sprouting increases micronutrient density and enzymatic activity

These processes represent a convergence of traditional knowledge and modern nutritional science, enabling better physiological utilization of millet-based foods.

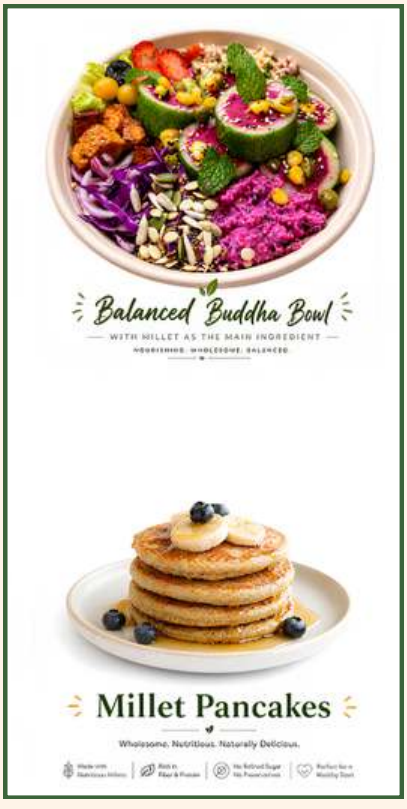
3. Clinical Relevance in Contemporary Nutrition Practice

Millets demonstrate significant applicability in preventive and therapeutic nutrition strategies. Their low glycemic index, high fibre content, and presence of bioactive compounds support their integration into structured dietary protocols.

They are particularly relevant in:

- Glycemic management and diabetes care
- Weight regulation and satiety control
- Cardiometabolic risk reduction
- Correction of micronutrient deficiencies

When applied strategically, millets function beyond staple foods and contribute to measurable clinical outcomes.



These applications focus on:

- Supporting glycemic balance in individuals with insulin resistance
- Enabling sustainable weight management through high-satiety meals
- Enhancing gut health via fiber-rich, microbiome-supportive formulations
- Providing nutrient-dense options for active and performance-focused individuals

Rather than being used in isolation, millets are integrated into carefully designed meal compositions that combine macronutrient balance with functional intent.

This approach ensures that nutritional science is translated into practical, scalable, and effective dietary solutions.

5. From Ingredient to System

The value of millets lies not only in their composition but in their application.

When integrated intelligently, they transition from individual ingredients to components of a larger nutritional system—one that supports long-term health, metabolic efficiency, and disease prevention.

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When AI Becomes Labor

Cynthia Zhu- Founder Agri-AI BV (Value creation for Agri food sector)

In the first quarter of 2026, venture capital investment in North America reached 250 billion dollars — three times the amount recorded in the previous quarter. More than 87% of that total flowed into AI-related companies. This marks a significant shift in investor expectations. The market is no longer focused solely on AI that can write texts, summarize documents, or hold conversations. Increasingly, capital is being directed toward AI that can actually perform work.

This new phase is often described as Agentic AI: systems that do more than generate answers. They can understand goals, break down tasks, use software tools, connect with other systems, and carry out actions with limited human intervention. In other words, AI is moving from being a passive assistant to becoming an operational actor.

For the Dutch food and agriculture sector, this development is especially relevant. Few sectors are as well positioned to benefit from this transition. Dutch agrifood already combines technological maturity with industrial discipline: highly automated greenhouse horticulture, data-driven cultivation and production methods, advanced food processing environments, and tightly coordinated supply chains. These are exactly the kinds of conditions in which agentic AI can move from theory to practical application.

The opportunities are substantial. In greenhouse horticulture, AI can support climate control, optimize energy use, detect diseases at an early stage, and improve yield forecasting. It can continuously interpret sensor data, compare real-time conditions with historical performance, and recommend or even initiate adjustments in lighting, irrigation, heating, and ventilation. In a sector where margins are under pressure and energy costs remain volatile, such forms of optimization can create immediate economic value.

In food processing, the potential is just as significant. AI can improve demand forecasting, allowing producers to align output more accurately with market needs and reduce waste. It can enhance quality control by identifying anomalies on production lines more consistently than manual inspection. It can support planning by coordinating raw materials, labor, logistics, and machine availability in real time. It can also strengthen traceability and compliance by monitoring product flows and documentation requirements across the chain.

What distinguishes Agentic AI from earlier forms of automation is that it does not stop at analysis. Traditional AI might identify a likely bottleneck or point out a quality issue. Agentic AI can go a step further: it can trigger a maintenance request, adjust a production schedule, initiate a follow-up check, or notify a supplier. That ability to translate insight directly into action is what makes it so attractive — and potentially so disruptive.

At the same time, that is precisely where the risk begins.

As long as AI only advises, the consequences of errors are relatively limited. A flawed recommendation can be ignored, corrected, or reviewed by a human operator. But once AI gains access to production systems, contract information, quality records, procurement workflows, or operational permissions, the nature of the question changes. The issue is no longer simply whether the technology is useful. It becomes whether it is controllable, auditable, and safe.

Recent incidents underline this concern. Security vulnerabilities in AI-connected systems, such as those reported around OpenClaw in the United States, show how fragile digital environments can become when AI is placed close to the execution layer. The closer a model operates to actual business processes, the greater the consequences of failure, manipulation, or unauthorized access. A system that can read data is one thing; a system that can alter settings, authorize actions, or trigger downstream processes is something else entirely.

For the food and agriculture sector, this distinction matters enormously. These are not purely digital environments where mistakes can easily be rolled back. They are physical, operational systems. In greenhouse horticulture, a wrong decision in climate control can affect crop quality or yield within hours. In food production, an incorrect action related to quality assurance or traceability can lead to compliance issues, recalls, reputational damage, or food safety risks. In logistics and supply planning, small errors can quickly ripple across the chain.

That is why the greatest challenge is often not the AI model itself, but the architecture around it. Questions of governance become more important than the model's technical sophistication. Who has access to which data? Which systems can the AI read from, and which can it write to? What permissions are granted, under what conditions, and with what human oversight? How is activity logged? How are exceptions handled? And what happens if the AI behaves unexpectedly ?
In practice, this means that organizations need to think in layers. The model may be powerful, but without strong controls around data governance, identity and access management, cybersecurity, and execution rights, that power becomes difficult to manage. Agentic AI should not be understood merely as a new software tool. It is an operational capability that must be embedded within a secure and well-governed digital infrastructure.

This is particularly relevant in the Dutch agrifood context, where companies often operate in complex ecosystems involving growers, processors, traders, retailers, technology suppliers, and regulators. Data and decisions move across organizational boundaries. That creates opportunities for coordination, but also raises questions about ownership, accountability

, and trust. If an AI system initiates an action based on data from multiple partners, who remains ultimately responsible? If operational decisions are partly automated, how can companies still demonstrate compliance and control ?

For many Dutch agrifood businesses, a hybrid model is therefore likely to be more realistic than full cloud dependence. AI solutions can, in principle, run very effectively in the cloud. Cloud infrastructure offers scalability, access to advanced models, and faster development cycles. But not every part of the value chain should be treated equally. Sensitive data, business-critical processes, and operational permissions are often better kept within a company's own controlled environment.

A hybrid setup allows organizations to combine the advantages of modern AI with the safeguards required for critical operations. Analytical and less sensitive workloads may be handled in the cloud, while high-risk functions remain on-premises or within tightly governed private environments. This is not a rejection of the cloud; it is a recognition that in operational sectors like food and agriculture, control matters just as much as innovation.

The broader implication is clear. AI is no longer just a digital assistant sitting at the edge of the business. It is increasingly becoming part of the labor force — not in a human sense, but as a system that can execute, coordinate, and intervene. That creates major opportunities for productivity, resilience, and smarter decision-making. But it also raises a new set of managerial and technical responsibilities.

For companies in the Dutch food and agriculture sector, the challenge is therefore not whether AI will become relevant. It already is.

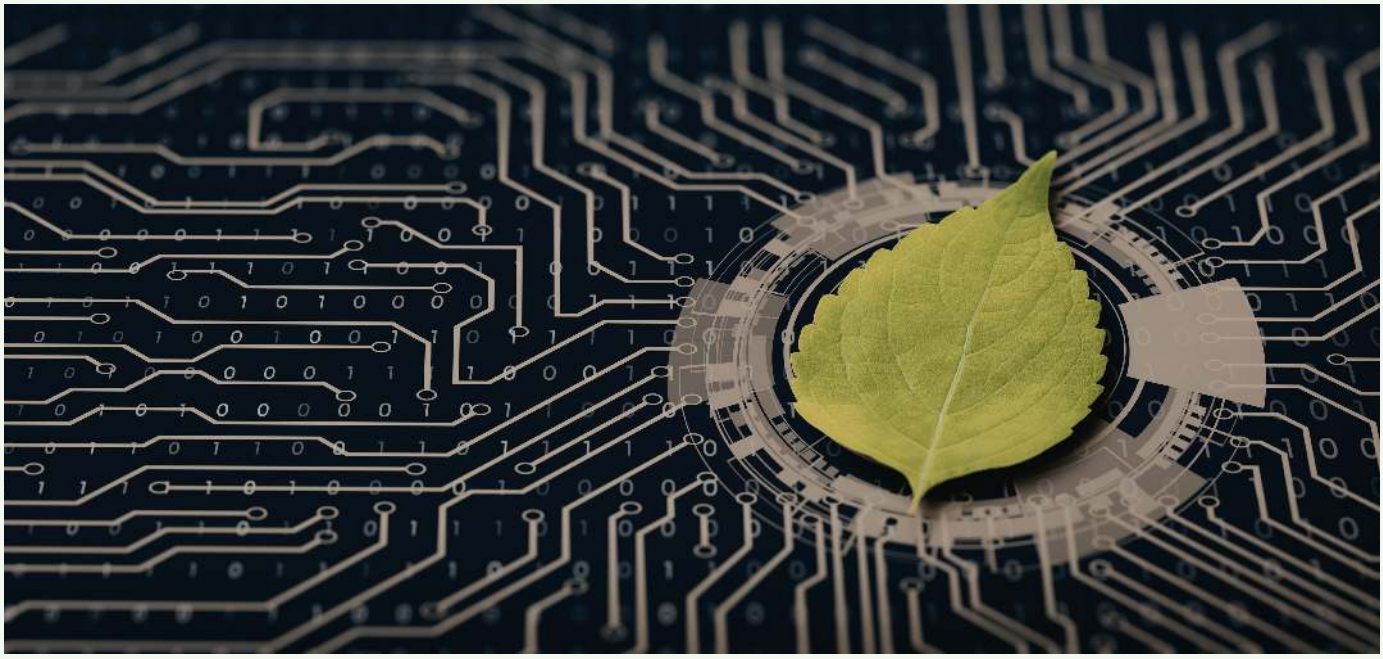
The real question is how to adopt it in a way that strengthens the business without weakening control.

Those who succeed will not necessarily be the companies with the most advanced models, but the ones that build the most robust foundations around them.

In that sense, the future of AI in agrifood will not be determined by intelligence alone. It will be determined by governance, architecture, and the ability to decide where automation should accelerate — and where human control must remain firmly in place.

Agri Facts

- Nearly one-third of the world's soils are moderately to highly degraded, affecting productivity, nutrient-use efficiency, and climate resilience.
- Rice cultivation contributes nearly 10% of global agricultural methane emissions, driving innovations in water-saving irrigation and low-emission farming.
- Women contribute substantially to agricultural labor globally, yet studies show that equal access to land, finance, and inputs could significantly improve farm productivity.



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Kavita Tiwari is a program Specialist working in Office of Principal Scientific Adviser to Govt of India, New Delhi, working at the intersection of innovation, strategic alliances, and technology policy. She has worked in Private Sector, Government and International NGOs with roles across India's innovation and investment ecosystem. The views expressed in this article are personal and do not represent any institutional position.

Abstract.
Indian agriculture is producing more innovation than ever before: ICAR and its institutions developed 2,661 climate-resilient crop varieties between 2014 and 2024; the country hosts an Artificial Intelligence Centre of Excellence dedicated to agriculture; and the agritech ecosystem includes more than 3,000 active startups. Yet farm-level adoption of frontier technology remains uneven. This article argues that India's defining agricultural challenge is no longer the generation of innovation, but the architecture of its diffusion. Drawing on publicly available data from the Indian Council of Agricultural Research (ICAR), the Ministry of Agriculture and Farmers' Welfare, NITI Aayog, the Food and Agriculture Organization (FAO), and recent independent industry studies, it sets out four structural levers — strategic alliances, digital public infrastructure, Farmer Producer Organisations, and demand-driven research — that together can close the lab-to-land gap and place Indian agriculture on a competitive footing for the next two decades.

1. The Indian Paradox: Innovation Abundance, Adoption Scarcity

Indian agriculture today sits at the crossroads of two seemingly contradictory realities. On one hand, the country is producing some of the most consequential agricultural research in the world. The Indian Council of Agricultural Research (ICAR) and its constituent institutions developed 2,661 biotic and abiotic stress-tolerant crop varieties between 2014 and 2024, of which 537 were specially bred for extreme climatic conditions using advanced precision phenotyping (ICAR, 2025). One hundred and fifty-two of these are biofortified, designed to address micronutrient deficiencies at scale. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), based in Hyderabad, released the world's first three-way pearl millet hybrid in January 2026, a variety designed for dryland zones receiving less than 400 mm of annual rainfall (ICRISAT, 2026).

On the other hand, average yields of most major Indian crops remain substantially below global benchmarks. India's foodgrain yield, at approximately 2,070 kilograms per hectare, lags well behind the comparable figures for China and several Southeast Asian peers (PRS India, 2024). Nearly 60 per cent of net sown area remains rainfed, and despite the steady expansion of micro-irrigation under the Pradhan Mantri Krishi Sinchayee Yojana, vast tracts of central and western India continue to face acute water stress. The paradox is therefore clear: India is not short of innovation; it is short of innovation that reaches the farm in time, at scale, and at affordable cost.

The **defining question** for Indian agriculture is no longer **'what can we invent'**, but **'how do we ensure that what has already** been invented reaches the smallholder before the next monsoon'

2. Why the Innovation-to-Adoption Gap Persists

The reasons the lab-to-land gap remains stubborn are structural rather than scientific. A combination of fragmented landholdings, asymmetric information, weak last-mile extension, and limited risk-bearing capacity at the farm level conspire to slow adoption of even the most promising technologies. Four specific constraints deserve particular attention.

2.1 The fragmentation of landholdings

Approximately 86 per cent of India's farmers operate on holdings of less than two hectares (Agricultural Census, 2015–16). A new high-yielding variety, an efficient drip system, or a precision-agriculture sensor that pays back handsomely on a ten-hectare farm in Punjab may not be commercially viable on a one-hectare farm in Bundelkhand. Innovation pathways that ignore this distribution skew toward serving the top decile of farmers, leaving the majority untouched.

2.2 The extension deficit

India has roughly one public-sector agricultural extension officer for every 1,000 to 1,200 farmers, far short of the FAO-recommended ratio of one per 400. Krishi Vigyan Kendras (KVKs) — the principal interface between research and farmer — number around 731 across the country, but the burden of demonstrating thousands of new varieties, machines, and practices to millions of farmers exceeds any reasonable human capacity. The result is that a variety released in a research station in 2023 may not be visible to a farmer in a remote district until 2027 or later.

2.3 Asymmetric risk

Adopting an unfamiliar variety, technology, or input is a probabilistic decision under uncertainty. For a marginal farmer, a single bad season can mean indebtedness, distress migration, or worse. In the absence of strong crop insurance penetration — the Pradhan Mantri Fasal Bima Yojana now covers a significant share of insured area but remains uneven in claim settlement — the rational response of the marginal farmer is conservatism. Innovation diffusion economics is fundamentally a function of the farmer's loss-bearing capacity, and that capacity is structurally low.

2.4 The supply-push problem

Most agricultural research in India is conducted in a supply-push mode: scientists develop what they believe will be useful, and extension is then asked to push it into the field. This contrasts with consumer-electronics or pharmaceutical R&D, where significant resources are invested in understanding

AGRI FACTS

Climate-resilient agriculture increasingly integrates traditional knowledge with modern science for adaptive farming systems.

Studies show that diversified cropping systems often improve long-term resilience against pests, market shocks, and climate variability.

Nearly one-third of fish stocks are overexploited globally, increasing pressure on sustainable aquaculture systems.

latent demand before development begins. The consequence is a portfolio of innovations of variable real-world relevance, some of which are technically excellent but commercially or behaviourally non-viable at scale.

3. Four Structural Levers to Close the Gap

Closing the innovation-to-adoption gap will require a deliberate architecture rather than incremental adjustments. Four levers, applied together, can compound to produce step-change improvements in adoption velocity and inclusivity.

3.1 Strategic alliances between government, industry, and academia

No single actor in the Indian agricultural ecosystem possesses all the ingredients required for end-to-end innovation delivery. Public research institutions hold the deepest scientific expertise and access to germplasm; private agritech firms hold the design, distribution, and customer-experience capabilities required to deliver at scale; and academic institutions hold the talent pipeline. Strategic alliances — formal, contractual, and performance-measured — between these three pillars are the most efficient mechanism for translating a publicly funded innovation into a privately delivered farm-level outcome. International examples from Brazil's Embrapa-private sector partnerships and the Netherlands' Wageningen-industry consortia indicate that such alliances, when well-designed, can compress adoption timelines by five to seven years.

3.2 Digital Public Infrastructure for agriculture

India's success with digital public infrastructure (DPI) in payments (Unified Payments Interface) and identity (Aadhaar) offers a template for agriculture. AgriStack,

the Farmer Registry, and the India Digital Ecosystem of Agriculture (IDEA) frameworks aim to create a verified, consent-based, interoperable data layer for the farm sector. With such a layer in place, advisory services can be personalised down to the level of a single farmer's geo-tagged plot, credit can be extended on the strength of historical yield data, and inputs can be matched to soil-test records. The Open Network for Digital Commerce (ONDC), extended to agriculture, opens the prospect of direct farmer-to-buyer transactions without the layered intermediation that currently captures much of the value chain margin.

3.3 Farmer Producer Organisations as adoption units

If 86 per cent of Indian farmers operate on holdings too small to justify individual adoption of frontier technology, the answer is to aggregate them into adoption units. Farmer Producer Organisations (FPOs) — legally recognised collectives of farmers under the Companies Act — provide exactly this aggregation. The Government of India's commitment to forming 10,000 FPOs by 2027–28 represents one of the most consequential institutional design choices for Indian agriculture in a generation. A well-run FPO of 500 to 1,000 members can collectively absorb a custom-hiring centre for precision-agriculture machinery, negotiate bulk procurement of climate-resilient seed, secure crop insurance at favourable rates, and deploy farm-management software that would be uneconomic on any single member's holding. The FPO is, in essence, the missing institutional layer between the smallholder and the modern agritech innovation.

3.4 Demand-driven research

Reversing the supply-push problem requires deliberate effort. Periodic reverse-briefing exercises — in which farmer and FPO representatives present prioritised pain-points to ICAR institutes and KVKs before research cycles begin — are simple to organise and high-leverage. Where they have been piloted, they have shifted research portfolios toward problems of higher immediate commercial salience, such as short-duration varieties for compressed sowing windows, machine-harvest-compatible varieties for labour-scarce regions, and varieties with stress tolerance specific to local agro-climatic zones. The corresponding reform on the funding side — competitive research grants that explicitly require evidence of stakeholder demand articulation before awarding funds — is equally important.

Lever	Mechanism	Expected Adoption Effect
Strategic Alliances	Tripartite agreements between public research institutions, private agritech firms, and academic talent pipelines	Compresses lab-to-farm timelines from 8–10 years to 3–4 years (international benchmarks)
Lever	**Mechanism**	**Expected Adoption Effect**
Digital Public Infrastructure	AgriStack, Farmer Registry, India Digital Ecosystem of Agriculture (IDEA), and ONDC for agriculture	Enables targeted advisory, credit, and input delivery to verified farmer identities
Farmer Producer Organisations	Aggregation of 86% of marginal and small farmers into legally recognised collectives	Reduces unit costs of innovation adoption by 25–40%; spreads risk across membership
Demand-Driven Research	Reverse-brief model: farmer pain-points drive research portfolio, not vice versa	Raises commercial viability of new technologies; improves R&D return on investment

Table 1. Four structural levers for closing India's innovation-to-adoption gap.

4. The Climate Imperative

The urgency of these reforms is sharpened by the climate trajectory. The India Meteorological Department's first long-range forecast for 2026 places the southwest monsoon at approximately 92 per cent of the Long Period Average, with a 61 per cent probability of El Niño developing between May and July (IMD, 2026). It is the lowest first-stage forecast in twenty-six years. With nearly half of India's sown area dependent on the monsoon, the implications for the 2026 kharif season are immediate, and the policy and institutional response window is narrow.

The good news is that the innovation base required to absorb such shocks already exists in significant measure. Drought-tolerant pearl millet, sorghum, and pigeonpea varieties suited to growth durations of 70 to 90 days have been released by ICAR and ICRISAT for cultivation in dryland zones. Micro-irrigation systems, which can save 40 to 50 per cent of water and improve productivity by

20 to 30 per cent (Ministry of Agriculture, 2024), have been operational for over two decades. Climate-resilient paddy varieties capable of withstanding submergence and prolonged drought now cover an increasing share of kharif paddy area. The constraint is not technological. It is the speed and the inclusiveness with which these existing solutions reach the farms most exposed to climate stress.

It is here that the four levers described in Section 3 become not merely desirable but essential. A climate-stressed kharif season, mediated by strategic alliances, digital public infrastructure, FPO aggregation, and demand-driven research, looks dramatically different from the same season mediated only by traditional supply-push extension. The difference is measured in millions of tonnes of avoided loss, and in millions of households spared from the cycle of debt and distress migration that has historically followed monsoon shortfalls.

5. An Investment Case for Innovation Diffusion

From a public finance perspective, the case for investing in innovation diffusion is compelling. India's agricultural research expenditure stands at approximately 0.6 per cent of agricultural GDP, well below the 1 per cent benchmark recommended by international development bodies and the levels maintained by Brazil and China. The bulk of even this modest expenditure is directed toward research generation rather than diffusion. A modest reallocation — toward strategic alliance facilitation, FPO capacity building, digital extension, and demand-articulation infrastructure — would likely produce returns that comfortably exceed those of marginal research expenditure, simply because the inventory of unused or under-used innovation is so large.

Equally important, the private capital required for the diffusion stack is increasingly available. India's agritech sector attracted significant venture capital between 2020 and 2024, with companies operating across precision agriculture, market linkages, advisory services, and agri-fintech. The structural problem the sector faces is not a shortage of capital but a shortage of routes through which capital can reach farmers economically. Public-private alliance architectures, with their potential to lower customer acquisition costs and create trusted last-mile rails, are also the missing piece of the agritech investment case.

6. Conclusion: Innovation Is Necessary; Diffusion Is Decisive

India enters the second half of the 2020s with an agricultural innovation base of historic depth. The varieties have been bred. The technologies have been built. The startups have been founded. The data infrastructure is being laid. The remaining task — and it is decisive — is to translate this base into farm-level outcomes for the 100 million-plus farming households on whose welfare the country's rural prosperity depends.

The choice before policy-makers, researchers, industry, and the farming community is not between innovation and tradition. It is between innovation that arrives at the farm in time and at scale, and innovation that remains a footnote in a research report. The four levers — strategic alliances, digital public infrastructure, FPOs, and demand-driven research — are not mutually exclusive. They are mutually reinforcing, and they require no new science to begin operating. They require only the institutional decisions to invest in diffusion with the same seriousness with which India has invested, for half a century, in invention.

The **next chapter of Indian agriculture** will not be written by a single breakthrough technology. **It will be written by the architecture that ensures every breakthrough already in our possession** reaches every smallholder **who needs it,** before the next monsoon, the next heatwave, and the next market shock.

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From Agriculture to Agri-Culture Ingredients for a Creative Economy

This article is partly based and builds on Dr Isabelle Antunes & Serge Lemana Oyono award-winning book:
Flavours of Influence: The Rise of Cameroon as a Food Power
published by Soft Power Fabrique, 2026, Singapore.

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About
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Dr. Isabelle Antunès is a development economist, cultural geographer, and Founder of Soft Power Fabrique, a Singapore-based economic design and publishing studio.
She holds a PhD in Geography and Planning from Sorbonne University, with expertise spanning food systems, territorial development, and the ways value is created, circulated, and retained within economic systems.
Her work bridges research, field-based practice, economic design, and narrative projects to strengthen influence, reshape economic dynamics, and improve understanding of food systems and value creation.

Through her work, including Flavours of Influence: The Rise of Cameroon as a Food Power, Dr. Antunès introduces and calls for reconnecting agri-culture, positioning cuisine as a powerful driver of economic transformation, identity, and differentiation.

About
Dr. Giulia Ajmone Marsan

Dr. Giulia Ajmone Marsan is an internationally recognised expert in innovation strategy, technology, entrepreneurship, and ecosystem development.

She currently serves as Secretary General of United Afro Experts for Innovation (UAEFI) and previously held leadership roles at ERIA and the OECD.

She has worked with governments, international organisations, and innovation ecosystems across Africa, ASEAN, Europe, the Indo-Pacific, MENA, and the Americas, including active contributions to the G20 Startup20 engagement group.

Giulia contributes to global dialogue on innovation, technology policy, and entrepreneurship through research, publications, and international collaborations.

She holds a PhD in Applied Mathematics and the Economics of Complex Systems from EHESS, Paris, and IMT School for Advanced Studies, Italy.

Ingredients for a Creative Economy

Introduction: Linking agriculture to the creative economy

Agriculture and the creative economy are often viewed as separate domains, each with distinct purposes and identities. Agriculture is typically framed as a system of production, structured around yields, inputs, and efficiency, and largely driven by commercial incentives that prioritize volume, calorie output, and exports. The creative economy, by contrast, encompasses sectors linked to innovation, art and culture, gastronomy, design, media, and branding. However, this distinction overlooks a crucial reality: food systems are inherently creative and transformative, even if they are not yet widely recognised or designed as such. Rethinking agriculture through this lens reveals production, culture, and innovation as interconnected elements within a single, dynamic system shaping not only what economies produce, but how they create and retain value.

Shifting from an old paradigm to creativity-driven systems

Across geographies, a recurring pattern can be observed: while biodiversity and culinary knowledge remain available, economic systems tend to recognise value primarily through volume and a narrow range of conventional products, which are increasingly standardised across countries. Today, agricultural production is largely shaped by commercial strategies rather than by building on a country's own assets. As a result, ingredients progressively disappear from markets, long before they disappear from ecosystems. What remains is volume concentrated on a narrow set of products, rather than value emerging from diversity. This pattern reveals a structural limitation: agriculture, as currently organised, is not designed to recognise or retain the full value of what it produces.

How to enact this paradigm-shift: from agriculture to Agri-Culture

Across food systems, a structural inversion is required. Rather than treating agriculture as the starting point and culture as an outcome, this approach begins with cuisine, understood as the expression of how ingredients are selected, combined, and transformed.

In this perspective, agriculture produces ingredients, culture shapes their use, and cuisine becomes the organising principle that defines how ingredients are produced, combined, and transformed into value. When cuisine leads, production follows, and creativity becomes the engine of value creation.

This shift opens new possibilities grounded in biodiversity, natural circular processes, and creative combinations. For instance, introducing hibiscus into quail feed is a promising natural strategy to improve the physical quality of the meat. In Cameroon, scientists are demonstrating that using black soldier fly frass to cultivate moringa enhances its nutritional properties while regenerating the soil. These examples illustrate how creativity, embedded in biological systems, can transform both production and value.

At the heart of this approach lies a **simple equation:**

Cuisine = Ingredients × Alchemy × Personality × Heritage

Personality reflects the distinctive expression of a cuisine

Alchemy refers to the transformation of ingredients through processes such as cooking, fermentation, and processing, where technique and creativity reveal or enhance their properties. Personality reflects the distinctive expression of a cuisine, shaped by place, culture, and practices, enabling differentiation. Together, they allow ingredients to become value.

This transformation is structural. It requires connecting production, transformation, standards and regulation, entrepreneurship, and markets into a coherent system.

Public policy plays a central role in structuring food systems. Today, agricultural systems are largely shaped by policies designed around volume and exports, often prioritising calories and a limited set of commodities. As a result, they support interchangeable goods rather than differentiation.

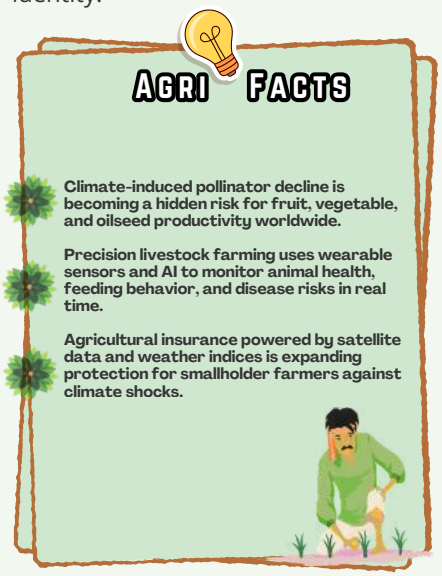
Reorienting these systems requires designing policies in relation to cuisine, enabling the production and availability of diverse ingredients that allow it to express and expand, creating value through identity and irreproducibility.

AGRI FACTS

- The "One Health" approach increasingly connects soil, plant, animal, and human health, influencing modern agricultural policies.
- Salinity now affects over 20% of irrigated land globally, threatening productivity in major food-producing regions.
- Genome editing tools such as CRISPR are being explored to develop crops with improved climate resilience and disease resistance.

This approach is further developed in Flavours of Influence, which examines how food systems, based on the example of Cameroon, can be structured as engines of economic transformation, anchoring real-economy development, strengthening SMEs, and generating new pathways for entrepreneurship.
Such systems enable value to circulate rather than dissipate.
This does not imply a trade-off with volume. When networks of firms (especially SMEs) are effectively connected, volume can emerge through aggregation and circulation, often in more resilient and adaptive ways than through concentration on a narrow set of commodities. This dynamic is also observed in network-based production systems and industrial districts around the world.
By anchoring transformation closer to origin and linking actors more coherently, these networks create conditions for stronger local economies, more resilient food systems and more distributed forms of volume. Ultimately, this points toward what can be described as an irreplaceable economy, one that does not compete through standardisation, but through uniqueness; not through scale alone, but through identity.
These dynamics are already emerging across sectors and geographies, but they remain fragmented and marginal, highlighting the gap between isolated innovation and systemic transformation.
Moving beyond these fragmented initiatives requires a more deliberate structuring of food systems. When agriculture is reconnected with culture, food systems can intersect with the broader creative economy — where value is shaped through design, experience, and innovation ecosystems — opening pathways for diversification and higher-value activity.
This is precisely why Flavours of Influence introduces and calls for reconnecting Agri-Culture.
Agri-Culture as engine of innovation and economic diversification

This shift from agriculture to Agri-Culture enhances cross-sectoral diversification and connects food systems to key sectors of the creative economy, from fashion and tourism to hospitality and cultural experiences.
Take SukkhaCitta, an award-winning Indonesian fashion startup that grounds its business model in regenerative farming, 100% plant-based dyes, and circularity. Its agricultural innovations enable the development of new plant-based textiles and distinctive Indonesian batik designs, drawing on natural ingredients such as indigo and banana flowers. In doing so, the company creates value not only for consumers but also for rural ecosystems and communities. This model shows how combining agriculture with design, artistic heritage, and innovations gives rise to premium products, positioning a company like SukkhaCitta in higher-value segments in both domestic and export markets.
Another example from Indonesia comes from the gaming industry. Gambir Game Studio developed Selera Nusantara, a restaurant cooking game in which players prepare local Indonesian dishes. The game has been downloaded more than 5 million times. Building on this success, the studio released KuloNiku: Bowl Up!, another video game that expands the use of food into interactive cultural and experiential formats. In this case, food systems extend beyond physical products, becoming assets within the cultural and digital economy, broadening value creation pathways and reaching a more diverse set of consumers.
Urban ecosystems are also key. Cities such as Battambang, Kuching, Iloilo, Phetchaburi, and Phuket have been included in the UNESCO Creative Cities of Gastronomy Network, recognising places where cuisine is deeply connected to culture, community, and sustainability. Similarly, Singapore's hawker dining culture has been inscribed on the UNESCO Intangible Cultural Heritage Lists. These recognitions reinforce local identity, enabling cities to differentiate themselves while strengthening their position in global tourism and cultural markets, and attracting investment and talent through their culinary identity.



Such initiatives illustrate how biodiversity, when connected to creativity and cultural narratives, can become a strategic infrastructure for knowledge generation and value creation.

In Africa, as proposed by Flavours of Influence, Cameroon could establish a National Museum of Herbaria showcasing the country's collection of edible resources, linking biodiversity preservation with education and research, inspiring food-based industries, tourism, and entrepreneurship within the creative economy. Such initiatives illustrate how biodiversity, when connected to creativity and cultural narratives, can become a strategic infrastructure for knowledge generation and value creation.

These examples suggest that enabling the shift from agriculture to Agri-Culture requires rethinking how agricultural systems are connected and combined with other sectors to create value, drive innovation, and foster entrepreneurship. From a strategic perspective, this transformation can enable countries and firms to reposition themselves within value chains, moving from volume-based competition toward more differentiated, higher-value activities rooted in local assets and cultural identity, whether reflected in hawker culture in Singapore or batik weaving traditions in Indonesia. This shift also depends on how effectively these elements are brought into relation, allowing knowledge, resources, and capabilities to reinforce one another and support the emergence of new forms of value.

Conclusion

The transition from agriculture to Agri-Culture, and its extension into the creative economy, points toward a broader rethinking of how food systems are designed and governed. It suggests moving beyond sectoral approaches toward more integrated frameworks that connect production, culture, and innovation.

From a policy perspective, this raises the importance of stronger coordination across sectors, enabling diverse forms of value creation, and supporting ecosystems where farmers, entrepreneurs, and creative actors can operate in more connected and mutually reinforcing ways.

It also opens new strategic opportunities for countries to position themselves differently within global value chains - not through scale alone, but through identity, differentiation, irreplaceability and cultural assets.

In this context, Agri-Culture does not represent an additional layer but a shift in how policy engages with food systems, centered on the reorganization of how value is generated and retained, and enabling economies to move from volume-based competition toward differentiation, resilience, and sustained value creation.

Agri Facts

- Black Soldier Fly larvae are increasingly used in feed systems as a sustainable protein source for poultry and aquaculture.
- Urban agriculture contributes not only to food production but also to heat reduction, biodiversity, and urban resilience.
- In many countries, farmer producer organizations (FPOs) help smallholders improve bargaining power and market access.

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FROM FIELDS TO THE WORLD
INTERNATIONALISING AGRICULTURAL EDUCATION IN INDIA

THE WSU–ICAR PARTNERSHIP AND THE MAKING OF A GLOBAL MODEL

Dr. Nisha Rakhesh

Dr. Nisha Rakhesh ,Director (Global Initiatives and Engagement) Western Sydney University

Dr. Nisha Rakhesh is an internationally recognised researcher and strategist with over 17 years of experience in agriculture, horticulture, and sustainable food systems. She leads Western Sydney University's transnational research and education initiatives across South and South East Asia, forging high-level partnerships with global organisations including the FAO, World Bank, CGIAR, and leading agribusinesses such as Bayer, Syngenta, and PepsiCo.
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Dr. Sindhu Sheoran is associated with Western Sydney University, where she is engaged in advanced work in the field of agriculture and environmental sciences.

Her professional journey reflects a strong focus on scientific research, knowledge sharing, and contributing to innovation in sustainable agriculture systems. She has been involved in collaborative research initiatives, particularly around smart farming and environmental resilience. Her work is also aligned with broader industry and institutional engagement, reflecting active participation in knowledge exchange platforms and research-driven initiatives.

MOU signing with State AG University

India's Agricultural Imperative: A Sector at the Crossroads

India feeds more than a billion people. Its agricultural sector, encompassing over 600 million farmers and farm workers, remains the backbone of the national economy and the primary source of livelihood for nearly half the country's population. With the world's second-largest arable land area, the largest livestock population, and the third-largest fishing industry, India's agricultural footprint is immense. And yet, the sector faces a paradox: vast in scale, but navigating evolving productivity, sustainability, and post-harvest challenges continuing to address productivity and post-harvest optimisation opportunities, climate vulnerability, and a growing need for globally connected human capital & increasing demand for globally skilled professionals post-harvest efficiency remains an important area of ongoing improvement facing increasing pressures from climate variability and resource management needs At the same time, a rapidly urbanising population and growing middle class are reshaping domestic demand — creating pressure for more diverse, higher-quality, and consistently available food. These challenges cannot be resolved by agricultural practices designed for the 20th century.

What India's agriculture is undergoing a significant and exciting transformation Not just better seeds or irrigation systems, but a new class of agricultural professionals: researchers who understand genomics and machine learning, extension workers who can interpret satellite data, entrepreneurs who can build agri-tech ventures, and policymakers who can navigate the intersection of science, trade, and sustainability. The route to producing this talent runs through the internationalisation of agricultural education.

India's agriculture requires **not just better technology,** but a new generation of **globally equipped agricultural professionals.**

Honourable Director General ICAR - Dr M L Jat signing ICAR WSU workplan with WSU's Honourable Vice Chancellor- Distinguished Prof George Williams AO

Agriculture 4.0: What the Next Revolution Demands

The first three agricultural revolutions - the Green Revolution, the White Revolution, and the precision agriculture era each transformed what Indian farming could produce. Agriculture 4.0 is transforming how it is managed, researched, and taught. Agriculture 4.0 is defined by the convergence of digital, biological, and physical systems in farming.

It encompasses:

- Artificial intelligence and machine learning for crop disease prediction, yield forecasting, and supply chain optimisation
- Internet of Things (IoT) sensors and satellite imagery for real-time field monitoring and precision irrigation
- Genomics and CRISPR-based crop improvement for climate resilience
- Controlled environment agriculture — protected cropping, vertical farming, and hydroponics — for resource-efficient production
- Digital market platforms and blockchain for supply chain transparency and direct farmer-to-consumer trade
- Agri-entrepreneurship ecosystems that translate research into scalable commercial solutions

Training the agricultural workforce for this reality cannot happen in isolation. The knowledge, infrastructure, and pedagogical models required to teach Agriculture 4.0 continue to evolve globally across systems .They must be built collaboratively across institutions, disciplines, and international borders.

For India, this means a strategic shift from an inward-looking agricultural education system toward one that is globally connected, research-intensive, and innovation-oriented. The Indian government recognised this imperative when it launched the National Agricultural Higher Education Project (NAHEP), a landmark US$165 million investment designed to modernise agricultural higher education and build international linkages. That investment created the conditions for one of the most ambitious and successful agricultural internationalisation programs in the Asia-Pacific.

Why Western Sydney University ? A Partner Built for India

Western Sydney University (WSU) is ranked among the top 2% of universities globally and is the world's number one university for social impact (Times Higher Education Impact Rankings 2022–2025). It holds 5 Stars for Facilities, Inclusiveness, Innovation and Teaching, and its Business School carries AACSB accreditation; an elite standard achieved by only 6% of institutions globally.

Underpinned by world-class research infrastructure through the Hawkesbury Institute for the Environment (HIE), WSU holds ERA 5 (World Class) ratings across ecological applications, soil sciences, ecology, evolutionary biology, microbiology, plant biology, zoology, and forestry sciences. Its protected cropping facilities, precision agriculture laboratories, EucFACE and other climate research infrastructure are among the most advanced in the Southern Hemisphere.

Nearly two decades, WSU has been building deep, reciprocal relationships with India's agricultural institutions, driving priorities through strong research partnerships, focused on high-impact sectors, creating global pathways with local access, and enabling inclusive growth and opportunity. As WSU describes its own position: "A trusted, long-term partner in India connecting local talent, global research, and industry to deliver real-world impact."

The WSU–ICAR Partnership: Building the Architecture for Change

WSU and the Indian Council of Agricultural Research (ICAR) - the apex body overseeing India's vast network of over 100 research institutes and 74 State Agricultural Universities (SAUs), formalised formalised a strategic partnership that would become one of the most expansive and impactful bilateral academic collaborations in agricultural education between India and Australia.

The partnership was built on a clear strategic logic: WSU's world-class capabilities in high-tech agriculture, protected cropping, environmental science, and agri-entrepreneurship were aligned strongly with priority areas identified by Indian agricultural universities . For WSU, the partnership offered access to one of the most important agricultural research ecosystems in the world -a network producing the next generation of scientists and practitioners who would shape food systems across South Asia and beyond.

Critically, the partnership was not designed as a traditional bilateral MOU sitting on a shelf. It was structured as a living, phased engagement beginning with capacity building, moving through faculty and student mobility, and progressing toward fully integrated dual degree programs and joint research infrastructure.

Phase One: Establishing the Foundation

The initial phase focused on formalising institutional relationships across India's agricultural university network. MOUs were established with ICAR and 30 State Agricultural Universities.

These agreements created the legal and institutional scaffolding for what followed: the largest-scale faculty and student mobility program in India–Australia agricultural education history.

NAHEP: Mobility at Scale

The National Agricultural Higher Education Project (NAHEP), funded by the Indian government and the World Bank, was designed to catalyse exactly the kind of international capacity building that the WSU–ICAR partnership embodied. WSU became one of NAHEP's key international delivery partners, a distinction earned through the depth and credibility of its existing relationships with the ICAR network.

The scale of what followed is remarkable in the context of India–Australia educational exchange:

- 150 faculty members and scientists from ten different State Agricultural Universities across India undertook intensive training programs at WSU
- Nearly 200 students participated in short-term mobility and exchange programs, gaining direct exposure to Australian agricultural research environments, industry practices, and world-class laboratory infrastructure
- Participating institutions spanned the breadth of India's agricultural geography — from Kashmir to Kerala.

This represents one of the largest and most successful agricultural education mobility programs of its kind between India and any international partner. The impact extended beyond the participants themselves. Faculty who returned from WSU brought back not just knowledge, but new pedagogical approaches, research methodologies, and professional networks. They became change agents within their home institutions, advocates for modernising curricula, establishing research collaborations, and encouraging students to pursue international opportunities.

For students, the experience was transformative. Exposure to WSU's advanced facilities in protected cropping, precision agriculture, food science, and environmental monitoring

150 faculty & nearly 200 students mobilised through **NAHEP** – one of the largest agricultural education exchange programs **between India & any international partner.**

opened pathways that had not previously existed for students from India's agricultural universities. The program demonstrated, concretely and at scale, that internationalisation in agricultural education was not a luxury reserved for elite metropolitan institutions, it was achievable across India's diverse network of State Agricultural Universities.

The COVID Catalyst: Innovation Under Pressure

When the COVID-19 pandemic struck in early 2020, it threatened to undo years of relationship-building and pipeline development. International borders closed. Student mobility ceased. Just as the partnership was preparing to welcome its first cohort of fee-paying students from India, the pathway appeared to shut.

Rather than pause, the partnership pivoted. An entirely new mode of engagement was developed: a suite of bespoke online short courses under the banner of "Western's Agricultural Empowerment Initiatives," specifically designed to address the knowledge and skill gaps identified through years of consultation with ICAR partner institutions.

The programs were interdisciplinary by design, spanning agri-technology, entrepreneurship, supply chain management, and precision agriculture. They incorporated academic course content, guest lectures from industry specialists, and interactive learning experiences adapted for the realities of online delivery to students and faculty in India.

The timing proved to be an unexpected catalyst. COVID-19 forced India's agricultural education system rapidly expanded its digital learning adoption to embrace digital delivery. The lockdowns created a captive audience of students and academics who were eager for high-quality international content and suddenly able to access it. The programs launched in early 2020 with approximately 200 participants from seven universities across India. Demand rapidly exceeded initial projections and interest extended beyond agriculture.

The response from senior Indian academic and government leaders was exceptional. These programs were recognised as a pioneering model for international collaboration in agricultural education, one that demonstrated how knowledge transfer could continue and even accelerate in conditions that would otherwise have ended it. More practically, the online programs kept the pipeline of student and faculty relationships alive, maintained WSU's position as the trusted international partner of choice, and provided a foundation from which in-person programs could resume stronger than before.

Dr Nicolene Murdoch, Pro Vice chancellor Global partnerships and TNE receiving Letter of Intent from Indian gov for establishing campus in India

WSU senior management with ICAR DDG (Education)

Tamil Nadu – Ag minister with WSU senior officers

The Dual Degree Program: Creating a Generation of Global Agricultural Leaders

The most transformative element of the WSU–ICAR partnership is the Dual Degree Program- a structured academic pathway enabling India's most meritorious agricultural students to earn doctoral and master's qualifications from both their home institution and Western Sydney University simultaneously. Launched in 2019, the program spans multiple levels and institutions:

- Dual PhD programs between WSU, ICAR, and 30 State Agricultural Universities
- Dual Masters by Research programs for students at the pre-doctoral stage
- Undergraduate collaborative pathways to extend the pipeline from the earliest stage of agricultural education

What distinguishes this program is its combination of academic excellence, global access, and genuine mentorship. Students selected for the Dual Degree Program are drawn from the top tier of India's agricultural university system, many are All-India rank holders

- in the highly competitive ICAR examinations. They conduct research at both institutions under the joint supervision of leading academics from India and Australia, gaining access to world-class laboratory and field infrastructure at WSU while maintaining their institutional identity and networks in India.

The First Cohort: What Success Looks Like

The outcomes of the first cohort, which has now completed, illustrate the program's transformative potential. These are not abstract outcomes reported in project evaluations — they are the career trajectories of individual researchers whose lives and work have been shaped by this collaboration:

- A student won the prestigious 3-Minute Thesis (3MT) Award at the Hawkesbury Institute for the Environment, earned a place on the HIE Honour Board, represented HIE in the university-wide 3MT competition, secured a $1,000 prize, and placed second in the 2023 Jann Conroy Award. Now serves as Lead Coordinator for HDR at WSU, overseeing research projects and partnerships across Australia and internationally.

WSU Provost signing work plan on dual degree programs with ICAR DDG

- Several graduates returned to their home institutions as Assistant Professors, bringing globally validated expertise back to strengthen India's own agricultural research capacity.Some are now working in corporate organisations in Sydney, demonstrating the program's reach into the professional sector beyond academia.
- One graduate was awarded a $15,000 research grant from the Genetic Society of Australasia and won the Ted Taylor Award from the Entomological Society of Australia, and is now pursuing post-doctoral research in the United States.
- A graduate who trained as a technology specialist at a Sydney-based vertical farming company now works in research governance at WSU.
- Masters by Research graduates have transitioned into fully funded PhDs at WSU and other leading Australian universities.

Dual Bachelor students have also delivered outstanding results: students successfully completed internships with agriculture and horticulture industries in Australia, with some offered permanent placements. This marks a significant achievement giving Indian students direct experience of Australian horticultural industries and professional skills, while simultaneously addressing the growing demand for skilled professionals in trained agricultural professionals that Australian industries are actively seeking to fill. It is a genuinely reciprocal model, and one that stands as a benchmark for bilateral agricultural education partnerships.

These outcomes are not outliers. They are representative of the calibre of students the program is attracting and the results it is generating. The program now has over 100 students enrolled from institutions spanning Tamil Nadu, Kerala, Haryana, Karnataka, Delhi, Rajasthan, Uttarakhand, Himachal Pradesh, Gujarat, Andhra Pradesh, Telangana, and Kashmir.

Alignment with Global Goals and Strategic Imperatives

The WSU–ICAR partnership is not only an educational achievement, it is a contribution to the global agenda.

The Sustainable Development Goals provide a framework for understanding its broader significance:

- SDG 2 — Zero Hunger: By producing researchers with deep expertise in climate-resilient crop systems,

post-harvest technology, and precision agriculture, the program directly strengthens the human capital needed to address food security challenges across India and the wider Indo-Pacific region.

- SDG 4 — Quality Education: The dual degree model establishes a new standard for quality in agricultural higher education — one that is internationally benchmarked, research-intensive, and accessible to meritorious students regardless of institutional location within India.
- SDG 13 — Climate Action: Research conducted through the program addresses biotic and abiotic stressors from climate change on major crops including rice, mangoes, and horticultural species, generating knowledge that feeds directly into adaptation strategies.
- SDG 17 — Partnerships for the Goals: The partnership architecture itself — spanning bilateral MOUs, government funding schemes, joint research infrastructure, and faculty and student mobility — is a model for how international educational partnerships can be designed to deliver systemic rather than transactional impact.

A Model Worth Replicating

What makes the WSU–ICAR partnership distinctive — and worth examining carefully as a model for the sector — is not any single initiative in isolation. It is the architecture that holds them together.

The partnership succeeded because it was designed as a system, not a project. It began with relationship-building and institutional trust. It built capacity before it recruited students. It pivoted intelligently when external shocks threatened to interrupt momentum.

The **partnership succeeded** because it was designed as a **system, not a project.**

It created multiple entry points — short courses, faculty exchanges, student mobility, and full dual degrees — so that partners at different stages of readiness could engage meaningfully. And it embedded the partnership within national government priorities (NAHEP) and global frameworks (SDGs) that gave it institutional legitimacy and sustainability.

This is the blueprint for internationalising agricultural education in India at the scale the moment demands. Not bilateral agreements that exist on paper, but living partnerships that produce researchers, strengthen institutions, and build the human capital that Agriculture 4.0 requires.

The WSU India Campus, Greater Noida: The Next Chapter

The WSU India Campus in Greater Noida, launching in February 2027, represents the natural evolution of twenty years of deep partnership with India. It is not the arrival of a new player, it is the permanent homecoming of a relationship already proven at scale. As WSU describes it, this campus embodies "deep roots, not a new arrival."

The campus is designed to deliver programs aligned with high-demand industry needs and to aligned with identified priority skill areas that have already been identified. It brings the full quality of an Australian university degree to India, dramatically are further strengthened through globally engaged institutions for global education while maintaining the academic standards, research depth, and industry connections that have made the WSU–ICAR partnership a benchmark for the sector.

The campus is not an extension of the existing partnership. It is its permanent institutional home in India- a physical infrastructure for everything the partnership has built over two decades: student teaching, research collaboration, industry engagement, entrepreneurship, and a direct pathway for Indian graduates into global academic and professional careers.

One Western: A Global Footprint with India at Its Centre

The WSU India Campus sits within WSU's "One Western" global strategy - a framework that integrates Greater Noida, and WSU's international presence in Hong Kong, Ho Chi Minh City, Surabaya, Sydney, and beyond into a single, coherent student experience. The One Western approach supports seamless cross-campus mobility, industry internships and placements, research, start-up incubation, and cross-border commercialisation.

For India, the significance is profound. WSU's vision is not merely to operate a campus in India but to build a platform for global impact: enabling India's knowledge leadership, integrating (not importing) education, and creating a hub for innovation, entrepreneurship, and research that is rooted in India and connected to the world.

More than **a campus** this is a promise to **unlock unlimited global opportunities** for every ambitious student.

Conclusion: The Harvest of International Collaboration

India stands at an agricultural inflection point. The challenges it faces - climate volatility, resource constraints, post-harvest losses, and the imperative to feed a growing and more demanding population are further strengthened through globally engaged institutions and globally educated professionals.

The WSU–ICAR partnership demonstrates that this is achievable. Through 150 faculty trained, nearly 200 students mobilised through NAHEP, a pandemic-era online program that kept momentum alive and expanded reach, a dual degree program now producing internationally recognised researchers across India's agricultural university network with over 100 students currently enrolled, and a permanent campus launching in Greater Noida in 2027- this collaboration has created a new benchmark for what agricultural internationalisation can achieve.

The harvest of this investment is already visible in the careers of the students who have passed through it, researchers winning national and international awards, academics returning to strengthen their home institutions, and professionals applying globally benchmarked skills to the challenges of Indian agriculture.

The field has been planted. The **knowledge is growing.** & the future of Indian agriculture is being shaped, in part, by the quality of the **global partnerships it builds today.**

Let Food Be Thy Medicine: **Reviving the Forgotten Wisdom of Nutrition**

About Author
Dipshikha Chaliha

Dipshikha Chaliha is a full-time lifestyle, gut and metabolic health expert.
She believes that 80% of wellbeing is enabled by balanced nutrition which is the best medicine and preventive healthcare measure.

A holistic fitness and movement enthusiast for life, Dipshikha works remotely from the serene city of Mysuru.

She provides sustainable, end-to-end solutions for nutrition and energy management to clients in both offline and online sessions through the Gut Feel Program.

Dipshikha recently published a wellness book titled **Gutsy: A memoir of metabolism**, meaning and becoming. If you have ever felt that the standard wellness conversation was missing something - some warmth, some story, some science that actually sounds like a human being wrote it. - then this book is for you.

The famous axiom, **"Let food be thy medicine,"** is universally attributed to Hippocrates, the ancient Greek physician born around 460 BCE.

Yet, long before recorded history, this timeless concept sat at the absolute centre of Ayurvedic philosophy.

Acharya Charaka, traditionally revered as the "Father of Ayurveda" and author of the foundational Charaka Samhita, built an entire system of holistic health, internal medicine and medical ethics around this very truth.

Hippocrates' words beautifully mirror a classic Ayurvedic proverb: **"When diet is wrong, medicine is of no use. When diet is correct, medicine is of no need."**

Ancient Indian philosophy, food culture and recipes were transmitted orally, passed down through the strong power of observation and heightened senses in a slower, unstimulated world.

Households cooked by watching their grandmothers, replicating complex recipes by memory, intuition, and taste. Long before modern nutritional science began retrofitting labels like gut-friendly, anti-inflammatory, slow-release starch, probiotics and prebiotics, traditional culinary cultures had already mastered them.

They understood the intricate chemical interactions between ingredients, textures, and flavours, adapting them seamlessly to seasonality and personal needs.

To truly make food our medicine today, we must return to the three foundational pillars that once governed human nutrition.

Pillar 1: Honouring the Circadian Rhythm

The first pillar of food as medicine is timely eating in sync with the sun's cycle — what we now know as the circadian rhythm. Historically, human biology perfectly matched nature's clock. We rose with the sun, worked and ate as it progressed and finished our last meal by sunset.

This routine was rooted in deep biological intent:

- **The Solar Zenith**: True hunger was timed and the first major meal was eaten at an appointed hour, typically closer to noon than first thing in the morning. The digestive fire (*agni*) in the gut is naturally primed when the sun is at its highest zenith — solar noon.
- **Microbial Activation**: The light of day signals gut microbes that are primed and ready to break down nutrients, assimilating them into essential peptides, enzymes, hormones, fatty acids, amino acids, and glucose.
- **Two Square Meals:** Our ancestors thrived on two sittings of freshly prepared, wholesome food consumed the same day — giving rise to the traditional phrase "do waqt ki roti" and the adage "early to bed, early to rise, makes one healthy, wealthy and wise".

Pillar 2: Reclaiming Our Place in the Food Chain

The second pillar rests on the deep, visceral connection between humans and the food chain. We were once an integral part of the environment—not above it or below it, but moving in harmony with its natural rhythms.
That balance shattered when food transitioned from a source of life into a mechanized, industrial complex that ruthlessly exploits nature. We have literally and figuratively lost touch with our sustenance. Eating modern processed food out of boxes with spoons in a 10-minute rush removes the biological and emotional cues that trigger healthy digestion. When we eat with our hands, we engage our sight and touch before the food even hits our tongues, sending vital signals that add to satiety and pleasure.

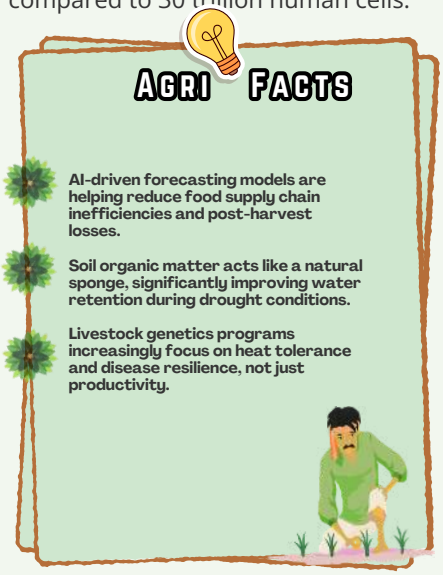
The severance of humans from the food chain is a primary driver of modern chronic illness. By outsourcing our kitchens to automation, cloud kitchens and industrial food brands, we flood our gastrointestinal tracts with processed items our guts can barely recognise. Without a set routine or real hunger, food morphs from nourishment into an addictive sugar fix. Because of mindless, midnight-to-morning munching, our cells never get the rest from the constant build-mode to switch off, rest and repair.

Inflammation begins from this constant state of digestion compounding into several metabolic syndromes by the 30s and early 40s. It is no surprise that insulin resistance and diabetes now affect 75% of adults as our eating frequency has exploded past those original two sittings.

Pillar 3: Embracing Biodiversity and Nutritional Rotation

The third pillar of utilising food as medicine is the rotation and diversity of macro and micronutrients. Before man-made rules fabricated rigid concepts of "pure" versus "impure" foods, humans ate purely based on seasonal availability.

Just as a healthy forest relies on a rich biodiversity of flora and fauna, our gut relies on a diverse diet to maintain its ecosystem. Modern, monocultural food fads (such as strict vegan, paleo, keto or fruitarian diets) often restrict this internal ecology. The human body hosts roughly 39 trillion bacteria compared to 30 trillion human cells.



Though they constitute just 0.2 kgs of our total body weight, these microorganisms are the tiny, internal pharmacologists making medicine out of what we consume. Only a varied diet rich in diverse proteins, vegetables, carbohydrates, fibres and fats can sustain them.
A limited diet inevitably creates nutritional gaps that translate into disease. Consider protein intake, which is chronically low in vegetarian demographics:

- **The Aging Muscle Gap:** At two critical stages of life — around ages 40 and 60 — the body loses significant muscle and bone density as its ability to synthesise protein drops.
- **Cellular Fatigue:** A chronically protein-deficient diet deprives the body of the amino acids essential for new cellular growth. The internal organs grow tired trying to regenerate using old, exhausted cells — which is a primary reason old age is so frequently associated with weakness and a stooped, infirm frame. Adequate protein intake throughout all stages of life can prevent old age from becoming debilitating.

The Art of Mindful Dosage

Bringing balance and slowness back to the table does not mean over-indulgence. Ayurveda aligns closely with the Japanese wisdom of Hara Hachi Bu — the practice of eating until you are only 80% full. Adhering to this, along with two square meals a day, naturally regulates our caloric needs.

Fasting should never mean starving; it means eating the right amount mindfully.
We respect dosages and fixed timings when it comes to synthetic pharmaceuticals, so why have we allowed ourselves to eat so randomly ?

The gut is the ultimate gateway to health.

How we fuel ourselves dictates our holistic wellbeing — it is quite literally the beginning and end of our vitality. Food can only work as medicine if we are mindful of how we heat, prepare and respect it. It is never too late to realign with our natural circadian rhythms, demand agricultural diversity and bring wholesomeness back to our plates.

The human body possesses immense resilience; with just a little tender love, care and mindfulness, it can completely revive itself after years of neglect.

Be healthy. Be gutsy.

AGRI FACTS

- Global demand for biological crop inputs such as biofertilizers and biostimulants is rapidly increasing in sustainable farming systems.
- Women farmers often invest a larger share of farm income into family nutrition, education, and household well-being.
- Satellite-based remote sensing can now estimate crop yield, soil moisture, and drought stress at field level.

Plant-Based Agriculture & The Indian Farmer

Understanding a Global Shift from the Ground Up

By Princi Bansal | Founder of VegGora | Conscious Commerce & Sustainable Living

About the Author

Princi Bansal is the Founder of VegGora, India's vegan & cruelty-free marketplace focused on promoting conscious consumer choices, sustainable living, and plant-based alternatives.

Through VegGora, she actively works toward increasing awareness around ethical products, compassion-driven lifestyles, and environmentally responsible consumption while supporting a more sustainable future for animals, people, and the planet.

India feeds the world — & always has.

VegGora
Save Animals, Save Earth

Long before sustainability became a global conversation, Indian farmers were growing some of the most nutritionally complete and environmentally efficient crops on earth. Lentils, chickpeas, millets, mustard, turmeric, sesame — these were not trendy ingredients. They were the foundation of one of history's most enduring agricultural civilisations.

Today, the world is catching up to what Indian agriculture has practised for centuries. And in this moment of global reconnection with plant-based food systems, Indian farmers stand at a remarkable crossroads — positioned not as followers of a trend, but as its original architects.

The Global Shift Toward Plant-Based Food Systems

Over the past decade, demand for plant-based foods has grown significantly across every major economy. This shift is driven by several converging forces: growing awareness of the environmental impact of food production, rising health consciousness among consumers, concerns about food security, and increasing interest in ethical consumption.

According to the Good Food Institute, the global plant-based food market was valued at over $8 billion in 2023 and continues to grow steadily. More significantly for Indian agriculture, the demand for specific plant-derived ingredients — pulses, millets, oilseeds, plant proteins, herbs, and spices — is rising in markets across Europe, North America, Southeast Asia, and the Middle East.

The United Nations declared 2023 the International Year of Millets, with India leading the global advocacy effort. This was not a symbolic gesture. It reflected a genuine international recognition that the crops Indian farmers have cultivated for thousands of years — jowar, bajra, ragi, foxtail millet — hold extraordinary potential for future food security, climate resilience, and nutritional sustainability.

For Indian farmers, this is not an abstract global trend. It is a market opportunity with deep roots in their own soil.

What Plant-Based Demand Means for Indian Farmers Specifically

Pulses and Legumes

India is the world's largest producer and consumer of pulses. Lentils, chickpeas, moong, urad, and toor dal are foundational to plant-based nutrition globally.

As international demand for plant protein grows, Indian pulse farmers are increasingly well-positioned to supply both domestic and export markets.

Diversification into high-value pulse varieties can offer better margins than many conventional crops.

Millets

Once considered a poor man's grain, millets are now being recognised globally as a nutritional powerhouse and climate-resilient crop. They require significantly less water than wheat or rice, grow in dryland conditions, and have a lower carbon footprint per kilogram of nutrition produced. Farmers in Rajasthan, Karnataka, Maharashtra, and Madhya Pradesh who grow millets are sitting on assets the world now actively wants.

Oilseeds

Mustard, sesame, flaxseed, and sunflower are essential ingredients in plant-based cooking and personal care products globally. India's oilseed belt has significant untapped potential in value-added processing and direct export of cold-pressed oils, which command premium prices in conscious consumer markets.

Organic Fruits, Vegetables & Spices

As consumers globally pay more attention to ingredient sourcing and chemical-free farming, certified organic produce from Indian farms commands growing premiums. States like Sikkim, which achieved 100% organic certification, have demonstrated that sustainable farming can also be economically competitive.

The Global Shift Toward Plant-Based Food Systems

Despite these opportunities, a genuine challenge exists. The gap between what Indian farmers grow and what conscious consumer markets demand is often a problem of connectivity, awareness, and infrastructure — not of agricultural capability.

Many farmers growing traditional, naturally plant-based crops are unaware that their produce aligns perfectly with emerging global demand. The millet farmer in Vidarbha and the organic turmeric grower in Erode are already producing exactly what health-conscious consumers worldwide are searching for — but the market signals have not always reached them clearly.

Several structural challenges contribute to this gap: limited access to processing infrastructure that converts raw crops into market-ready products; dependence on long intermediary chains that reduce farmer margins; lack of certifications (organic, non-GMO, fair trade) that unlock premium pricing in conscious consumer markets; and limited digital market access that would connect smallholder farmers directly to domestic and international buyers.

Addressing these gaps requires collaboration between farmers, agri-entrepreneurs, government programmes, and consumer-facing businesses — all working toward the same goal of making Indian plant-based agriculture more visible, more accessible, and more rewarding for the people who grow it.

Sustainable Agriculture Is Not a New Concept in India – It Is a Return

One of the most important perspectives often missing from global sustainability conversations is this: for much of India's agricultural history, farming was inherently sustainable. Mixed cropping, crop rotation, natural composting, rainwater harvesting, and seed saving were standard practice — not innovations.

The shift toward monoculture and chemical-intensive farming over the past several decades was driven by legitimate goals — feeding a growing population, increasing yields, achieving food security. Those goals were met.

But the environmental costs — soil degradation, water table depletion, biodiversity loss, and farmer debt — have been significant and well-documented.

Today's conversation about sustainable agriculture is, in many ways, a conversation about recovering what was lost. Regenerative farming practices, natural farming methods championed by leaders like Subhash Palekar, and the renewed interest in traditional Indian crop varieties are all part of a broader recovery of agricultural wisdom that Indian farmers already possessed.
This is a strength, not a starting point. Indian agriculture does not need to import sustainability — it needs to rediscover and modernise what it already knows.

The Consumer's Role in Supporting Indian Farmers

Ultimately, sustainable agriculture cannot survive on awareness alone. It requires markets. And markets are created by consumers.

When an Indian consumer chooses a millet-based product over a refined grain alternative, they are sending a price signal that travels back through the supply chain to a farmer's field. When they choose cold-pressed mustard oil over refined vegetable oil, they are supporting a traditional oilseed farmer. When they choose certified organic produce, they are rewarding a farmer who has taken the harder, more responsible path.

This is not about perfection or ideological rigidity. It is about the cumulative power of informed, incremental choices made by a population of 1.4 billion people. Even a small shift in purchasing patterns at scale creates meaningful agricultural and economic change.

India's younger generation — increasingly digitally connected, environmentally aware, and values-driven in their consumption — represents a transformative market force for sustainable Indian agriculture. The question is whether the ecosystem of education, access, and availability can develop fast enough to channel that awareness into action.

Looking Forward

The future of plant-based agriculture in India will be shaped by several intersecting forces:

climate adaptation, policy support for sustainable farming, investment in rural processing infrastructure, consumer education, and the growth of domestic markets for traditional crops.

India has every natural advantage needed to lead this transition — diverse agro-climatic zones, millennia of agricultural knowledge, a vast and increasingly conscious consumer base, and a growing community of agri-entrepreneurs building bridges between farms and markets.
The opportunity is real.

The foundation is strong. What is needed now is sustained attention, investment, and collaboration to build on both.

India's farmers have fed civilisations. With the right market connections and the right support, they are **fully capable of feeding a sustainable future too.**

AGRI FACTS

- Agricultural diversification into high-value horticulture, medicinal plants, and niche crops is increasingly shaping rural income systems.
- Circular agriculture models promote resource reuse, nutrient recycling, and reduced waste, improving long-term farm sustainability.
- Digital twins in agriculture are emerging to simulate farm conditions virtually, helping predict crop performance, irrigation needs, and risks.

AGRI FACTS

- Global warming is increasing the spread of crop pests and invasive species into new geographic regions, affecting biosecurity systems.
- Studies show that integrated pest management (IPM) can significantly reduce pesticide use while maintaining crop productivity.
- Controlled-release fertilizers improve nutrient-use efficiency by synchronizing nutrient release with crop demand.

KV Dialogue

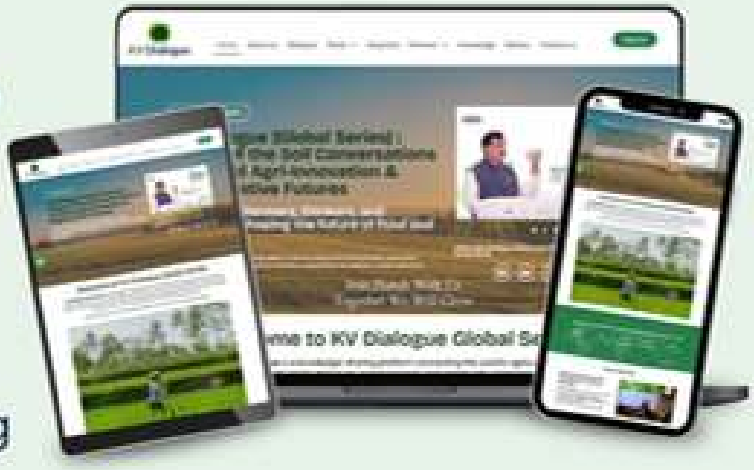
Website Launch

The Official Website of KV Dialogue Global Series is Now Live!

www.kvdialogue.in

Explore an exclusive, informative digital platform by KhetiValah Dialogues, designed to connect global agricultural voices, share powerful insights, and inspire sustainable action worldwide.

Join KhetiValah's Mission in Building a "Wealthy and Healthier Globe."



KhetiValah Dialogues will be presented in various regional and international languages:

Language	Name of the Dialogue	Day
English	KV Dialogue (Global Series)	Friday
Telugu	ఖేతీవాలా చర్చ – KhetiValah Charcha (Telugu)	Thursday
Tamil	கேவி உரையாடல் – KV Uraiyadal (Tamil)	Wednesday
Hindi (National)	खेती संवाद – KhetiSamvad (Hindi)	Monday
Uttar Pradesh	खेती संवाद – KhetiSamvadUP (Hindi)	Wednesday
Madhya Pradesh	खेती संवाद – KhetiSamvadMP (Hindi)	Friday
Marath	शेती संवाद – ShetiSamvad (Marathi)	Tuesday
Assamese	খেতি সংলাপ – KhetiSanglap (Assamese)	Tuesday
Gujarati	ખેતીનો સંવાદ – KhetinoSamvad (Gujarati)	Wednesday
Bengali	খেতি সংলাপ – KhetiSanlapa (Bengali)	Saturday
Rajasthani	खेता री बातां – Kheta Ri Bataan (Rajasthani)	Thursday
Kannada	ಖೇತಿವಲಾ ಸಂವಾದ – KhetiValahSamvada (Kannada)	Thursday
Odia	ଚାଷ ସଂଳାପ – ChasiSanglapa (Odia)	Tuesday
Meghalaya	KhetiKobor (Meghalaya)	Monday
Other countries		
Philippines	KV Diyalogo (Filipino)	Every Wednesday
Sri Lanka	කර්තිකා කිරීම – KarthikaKireema (Sinhala)	Every Wednesday
Other Verticals		
UrbanKrishi	Urban Gardening & Farming	Every Friday
TattvaVedika	Artificial Intelligence Dialogues	Thursday
NaariShakthi Samvad	Women Empowerment Dialogues	Saturday

COVER STORY INTERVIEW

Lakshman K.,Founder & Chairman (Haladhari Group) of KhetiValah, in an exclusive cover story interview with **Sonya Dewi Santoso,** Director of Asia, CIFOR-ICRAF.

Dr. Sonya Dewi Santoso

Director of Asia, CIFOR-ICRAF
Principal Landscape Ecologist
Landscape Conservation &
Sustainable Development Specialist

Biography

Sonya Dewi Santoso is the Director of Asia at CIFOR-ICRAF and a principal landscape ecologist based in Bogor, Indonesia. With more than 25 years of experience as a scientist, her work focuses on analysing trade-offs and synergies between conservation and development at the landscape level across diverse contexts. She has contributed to research and interventions in countries including Indonesia, Vietnam, India, Sri Lanka, China, Papua New Guinea and Brazil.

Her expertise includes integrating climate change mitigation into landscape governance. She has led initiatives in national and subnational carbon accounting, peatland restoration and management, and analysing the carbon footprint of oil palm production. She has also been a key advocate for inclusive, integrated land-use planning for low-carbon development and ecosystem services. This includes the development of a negotiation support tool adopted widely in Indonesia and introduced in Vietnam, Peru and Cameroon, which has guided the creation of Green Growth Master Plans and informed public-private-people partnerships in pursuit of the Sustainable Development Goals.

Sonya champions evidence-based solutions that strengthen climate and economic resilience, particularly for poor and vulnerable communities, including women and girls. A core part of her work involves enhancing smallholder farmers' capacity to practice climate-smart agriculture, such as agroforestry, and improve access to markets.She has led numerous large-scale projects supported by major donors, including the EU, GAC, IUCN, GIZ and DANIDA.

CIFOR

World Agroforestry

KhetiValah Interview With Sonya Dewi

By Dr. PaCIFOR-ICRAF is a global research organization dedicated to improving environmental sustainability and livelihoods through forestry and agroforestry research. Formed through the merger of the Center for International Forestry Research (CIFOR) and the World Agroforestry Centre (ICRAF), the organization works with governments, communities, and partners worldwide.

Its main focus areas include climate change, biodiversity conservation, sustainable agriculture, and forest management. CIFOR-ICRAF promotes innovative solutions that balance environmental protection with economic development. By conducting scientific research and policy studies, the organization helps create resilient ecosystems and supports communities in achieving sustainable development goals.ulina Naupu

1. Leadership & Global Vision

Q. As Asia Director of CIFOR-ICRAF, how do you see the role of agroforestry and sustainable land-use systems evolving in addressing interconnected challenges such as climate change, food security, and rural livelihoods ?

Asia is home to nearly 60% of the world's population, with population density far above the global average.

At the same time, more than half the population now lives in cities, and younger generations are increasingly moving away from rural areas.

This is leaving an ageing farming population behind and changing how rural landscapes function.

Against this backdrop, the challenge is clear: how do we produce enough food, support livelihoods, and maintain ecosystem services, all while dealing with the impacts of climate change ?

The answer lies in finding land-use approaches that work on multiple levels—economically, socially, and environmentally—and that fit specific local contexts.

Agroforestry is one of the most promising of these. By integrating trees with crops, livestock, and sometimes fish, farmers can diversify what they produce and reduce risks from market or seasonal changes.

At the same time, these systems help improve soil health, retain water, regulate microclimates, and store carbon. In very practical terms, they help farmers become more resilient while also contributing to broader climate and environmental goals.

2. Asia's Role in Global Sustainability

Q Asia is home to diverse ecosystems and millions of smallholder farmers. Why is the region so critical in shaping global climate action and food system outcomes over the next decade?

Asia is at the heart of the global sustainability challenge. It needs to feed almost 60% of the world's population using only about 30% of the world's land. It is also a major contributor to emissions from agriculture and land use, particularly from rice production, land-use change, peatland fires, and mangrove loss.

At the same time, the region is incredibly rich in biodiversity and is home to hundreds of millions of smallholder farmers—most of the world's total. These farmers are also among the most exposed to climate risks, from floods and cyclones to extreme heat.

So what happens in Asia matters globally. The region has to find ways to reduce emissions, adapt to climate impacts, and continue feeding its population—all while protecting ecosystems. This includes thinking beyond land alone, and looking at the connections between landscapes and seascapes, and between food systems and carbon systems.

If Asia gets this right, it will shape global outcomes in a very positive way. If not, the consequences will be felt far beyond the region.

3. From Research to Real-World Impact

Q CIFOR-ICRAF is known for translating research into action.

Can you share examples of science-led approaches creating tangible impact across Asia ?

Our focus is always on making research useful in real-world settings. In Indonesia, for instance, we are working on restoring peatlands by supporting fire-free land preparation and introducing agroforestry systems.

We're also involved in community-led mangrove restoration.

In other areas, we support kitchen gardens, climate-smart agriculture, and agroecological approaches, as well as agroforestry systems for crops like cocoa and oil palm.

In Vietnam, we've worked with farmers to restore sloping land using agroforestry systems that combine crops with fruit trees.

In the Philippines, our work includes cocoa agroforestry, watershed management, and restoration efforts that help communities adapt to climate change.

In India, we've supported the expansion of "trees outside forests" across several states, including systems for timber, medicinal plants, and spices, alongside policy development.

In Sri Lanka, we focus on sustainable land management through spice-based agroforestry.

5. Climate Resilience, Deforestation & Viable Solutions

Q. How can agroforestry offer commercially viable solutions that strengthen livelihoods while improving ecosystems?

Agroforestry doesn't work in isolation—it needs the right conditions around it.

That means identifying practices that fit local contexts, but also strengthening value chains so farmers can actually sell what they produce.

Access to finance is another key piece, as is secure land tenure.

Policies also matter. Farmers are much more likely to adopt these systems if there is clear support from governments.

Partnerships—with the private sector, communities, and others—are equally important, especially when it comes to building viable business models.

When these elements are in place, agroforestry can make real economic sense while also improving resilience and environmental outcomes.

5. Gender, Equity, and Social Inclusion

Q How does CIFOR-ICRAF integrate gender equity and social inclusion across its work in Asia ?

Women play a major role in agriculture and natural resource management across Asia, but their contributions are not always fully recognized or supported.

At CIFOR-ICRAF, we make a conscious effort to address this. One of the key issues is land tenure, which is often held by men. So we design our programs in ways that take these realities into account.
For example, in Indonesia, when we support communities in applying for social forestry permits, we ensure that women's needs and perspectives are included in the process.

More broadly, we integrate gender and social inclusion into our climate work, training programs, and knowledge-sharing efforts.

We try to go beyond simply including women, and instead support approaches that can shift roles and opportunities over time.

We also work closely with local partners to make sure these principles are applied consistently.

6. Partnerships and Policy Enablement

Q How do collaborations help scale sustainable land-use solutions, and what policy environment is needed ?

These challenges are too complex for any one group to address alone. Collaboration is essential—between governments, researchers, communities, and the private sector.

At the same time, policies need to reflect how interconnected these issues are. That means better alignment across sectors, and support for long-term approaches rather than short-term fixes.

Without that combination of collaboration and enabling policy, it's very difficult to scale solutions in a meaningful way.

7. Looking Ahead to 2030 and Beyond

Q What are the key priorities for transforming food, land, and forest systems ?

We need to move faster on both climate mitigation and adaptation, in rural and urban areas alike.

There's also a need to think more in terms of systems—how land, water, food, and ecosystems are all connected, including links between land and ocean systems.

The idea of One Health is also becoming increasingly important, especially as we look at how food systems affect both people and the environment.

And finally, we need to invest in younger generations.

That includes education, but also encouraging more sustainable patterns of production and consumption, including through the bioeconomy and circular economy.

8. Message to the Next Generation

Q What message would you share with young professionals entering this field ?

Be open to new ways of thinking, and don't be afraid to challenge existing approaches.
There are a lot of new tools available—from digital technologies to AI and precision agriculture—but what matters most is how they are used in real contexts.
Bridging knowledge and action is key. That's where real change happens.

9. Leadership Journey and Personal Vision

Q. What inspired your journey, and how has it shaped your vision ?

What has always drawn me to this field is its diversity—of people, ideas, and landscapes—and the fact that it is constantly evolving.

Working on land-use systems means dealing with complexity. You're always trying to find balance, build connections, and bring different perspectives together.

I've had the chance to work with a wide range of people—from farmers to policymakers, from scientists to business leaders—and that exchange is something I really value.

Spending time in different landscapes also stays with you. You see both their beauty and how vulnerable they are, which reinforces the importance of the work.

It's a continuous learning process. There is always something new to understand—from people, from nature, from experience—and that's what keeps it meaningful.

With Respect and Gratitude

We sincerely thank **Dr. Sonya Dewi Santoso** for sharing her valuable insights through this exclusive Cover Story Interview and for gracing the cover of the May 2026 edition of KhetiValah Global Agri Magazine.

We also extend our sincere appreciation to **Ms. Danielle Botti, Head of Global Outreach & Engagement at CIFOR-ICRAF**, for her continued support and timely coordination, and to Mr. Aris Sanjaya, Photo Video Coordinator at CIFOR-ICRAF, Indonesia, for his valuable support in providing relevant images and coordination assistance.

Their support significantly strengthened this meaningful agricultural knowledge exchange.

At KhetiValah Global Agri Magazine (e-magazine), we remain grateful for this opportunity to share such valuable perspectives with our readership.

Why Africa's Indigenous Crops Matter:
Lessons from Namibia's Omahangu (Pearl Millet)

By Dr. Paulina Naupu

About Author

Dr. Paulina Ndinelago Naupu is a Namibian lecturer and scientist specialising in dryland ecology, climate resilience, and sustainable agriculture. She holds a PhD in Natural Resource Sciences from the **Namibia University of Science and Technology (NUST).**

Her research focuses on drought-tolerant indigenous plant species, ecological restoration, and climate-smart agricultural systems in arid environments.

She is passionate about promoting indigenous crops as pathways toward food security, sustainable livelihoods, and resilient agricultural development in Namibia and beyond.

Lecturer, Department: Agricultural Sciences and Agribusiness | Namibia University of Science and Technology | Namibia

AGRI FACTS

- Blue foods (fish, seaweed, shellfish) are increasingly recognized for their role in nutrition security and lower environmental footprints.
- Heat stress can reduce pollen viability in crops, directly affecting grain formation and fruit yields.
- Climate-resilient livestock systems increasingly use shade, cooling technologies, and adaptive feeding to reduce production losses.

True freedom is eating what we grow.

In a world increasingly shaped by climate change, droughts, economic uncertainty, and disruptions in global food supply chains, food security has become one of the most urgent global concerns. Recent global events have shown that even countries with financial resources can struggle to access food when borders close, supply chains fail, or production declines. For many African countries, this reality highlights an important lesson: sustainable food security begins with strengthening local agricultural systems and investing in crops that are naturally adapted to local environments.

In Namibia, one such crop is Omahangu, commonly known as pearl millet. For generations, Omahangu has been a source of survival, culture, identity, and resilience for many households, particularly in the northern communal regions of Namibia. Today, as climate pressures intensify and conversations around sustainable agriculture continue to grow globally, Omahangu is increasingly being recognised not only as a traditional staple crop but also as a climate-resilient solution for the future of food security.

Namibia is one of the driest countries in sub-Saharan Africa, characterised by low and highly variable rainfall, frequent droughts, and harsh environmental conditions. These climatic realities make agricultural production difficult, especially for crops that require high water availability. Despite these challenges, Omahangu has continued to thrive under conditions where many other crops may struggle. Its ability to produce yields under limited rainfall makes it one of the most important crops for climate-smart agriculture in Namibia.

For many rural communities, Omahangu remains a staple food consumed daily in the form of porridge, traditional beverages, and various homemade meals. Beyond household consumption, the crop also supports livelihoods through local markets and small-scale processing activities. In many ways, Omahangu represents resilience, not only ecological resilience, but also social and economic resilience for communities that depend on agriculture for survival.

However, despite its importance, Namibia still imports a significant amount of food products annually. This dependence on imported food creates vulnerability, especially during periods of global instability. The reality is simple: when food supply chains are disrupted, imported food becomes expensive, inaccessible, or unavailable altogether. A full wallet means very little when there is no food on the shelves.

This is why indigenous crops such as Omahangu deserve greater investment and attention. These crops have evolved under local environmental conditions over centuries and are naturally equipped to survive climatic stress. Unlike many imported crop varieties, indigenous crops often require fewer external inputs, are more tolerant to drought, and are better suited to local ecosystems. In the context of climate change, these characteristics are becoming increasingly valuable.

Globally, there is growing recognition that the future of sustainable agriculture may depend heavily on underutilised indigenous crops. Climate-resilient crops such as pearl millet have the potential to contribute significantly to food and nutritional security, particularly in dryland regions vulnerable to water scarcity. Pearl millet is rich in nutrients, including iron, fibre, and essential minerals, making it not only environmentally suitable but also nutritionally important.

In Namibia, efforts are already underway to strengthen the pearl millet sector. Recently, the Food and Agriculture Organization (FAO), in partnership with the Ministry of Agriculture, Fisheries, Water, and Land Reform, officially launched Namibia's One Country One Priority Product (OCOP) initiative,

- focusing on Omahangu as the country's selected priority crop. The initiative aims to improve seed systems, strengthen farmer productivity, train seed growers, and enhance value chain development in the northern communal areas.

Such initiatives are important because agriculture today cannot focus only on production. There is also a need to focus on value addition, agroprocessing, market development, and youth participation. Omahangu has enormous potential beyond traditional consumption. Today, it can be processed into instant porridge, ready-to-eat cereals, snacks, bakery products, beverages, and composite flours. These opportunities create space for innovation, entrepreneurship, employment creation, and rural industrialisation.

Value addition also increases the economic value of agricultural products and reduces post-harvest losses. For young people, especially graduates entering the agricultural sector, agroprocessing presents an opportunity to transform agriculture from subsistence farming into a modern economic sector capable of generating income and employment. Women, who already play a major role in agricultural production and household food security, can also benefit significantly from local processing enterprises and value chain participation.

At the same time, promoting indigenous crops contributes to preserving traditional knowledge systems and cultural heritage. Omahangu is deeply embedded in Namibian culture and identity. Protecting and promoting such crops means protecting local knowledge, traditional farming systems, and community resilience that have sustained people for generations under difficult environmental conditions.

The conversation around agriculture must therefore move beyond simply increasing production. The focus should also include sustainability, resilience, localisation, and food sovereignty. Countries must invest in crops that are adapted to their own ecological realities rather than relying entirely on external food systems that may become unreliable during times of crisis.

Africa possesses a wealth of indigenous crops with untapped potential. Yet many of these crops remain underfunded, under-researched, and underutilised. As climate change continues to challenge conventional agricultural systems, there is a growing need to shift attention toward crops that can survive and produce under difficult environmental conditions. Indigenous crops are no longer simply "traditional foods"; they are part of the solution to future global food insecurity.

The future of agriculture in dryland regions like Namibia may not lie in imported solutions alone, but in rediscovering, modernising, and investing in the crops that have sustained communities for centuries. Omahangu is one of those crops. It represents resilience, sustainability, and hope for a future where communities are empowered to feed themselves despite climatic uncertainty.

Grow what you eat. Eat what you grow.

Food security is national security. Nations that can feed themselves are better positioned to withstand global shocks, economic instability, and environmental change. Therefore, protecting, promoting, and investing in indigenous crops should not be viewed as a backward step into tradition, but as a strategic investment into a more sustainable and food-secure future.

Agri Facts

- Biochar application in soils can improve nutrient retention, carbon storage, and microbial activity in degraded lands.
- AI-powered sorting systems in food processing can detect quality defects faster than manual grading, reducing food losses.
- Many horticultural crops depend heavily on night temperatures, making rising nighttime heat a hidden climate risk.

ROOFTOP GARDENS

RECLAIMING HEALTH, FOOD SECURITY, AND NATURE IN URBAN INDIA

Mrs. Sravanthi Reddy

About Author

Mrs. Sravanthi Reddy is the **CEO of F3 Farmers Producer Company (FPO) and Founder of KrishiUnnati Farm Products, Telangana, India.** She actively works with organic and natural farming communities, supporting farmers through capacity building, certification awareness, training programs, and market linkages.

As a **PGS-India National Facilitator, Certification Regional Council,** she has been working to promote natural farming, participatory certification systems, and sustainable agricultural practices, while helping strengthen farmer awareness and trust in organic production systems.

Through her initiative KrishiUnnati, she focuses on empowering farmers, connecting them directly with consumers, promoting safe food systems, and strengthening sustainable livelihoods, particularly across Telangana.

CEO, F3 Farmers Producer Company **(FPO)**
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F3 FPO

PGS-INDIA GREEN

KRISHI UNNATI
From Farmers to Families

Why should we remain only consumers of food when we can also become producers ?

India has traditionally lived in harmony with nature. With three well-defined seasons and a long history of natural and organic farming, food production was once deeply connected to the land, climate, and local ecosystems. However, the Green Revolution of the 1960s introduced modern methods to meet the food demands of a rapidly growing population, significantly altering agricultural practices. While it ensured food availability, it also brought increased dependence on chemical fertilisers, hybrid seeds, and intensive farming methods —gradually leading to soil degradation, declining nutritional value, and rising costs for farmers.

Over time, rapid urbanisation further widened the gap between people and food production. In search of professional and business opportunities, large sections of the population migrated to cities. Expanding urban infrastructure, multi-storey buildings, and road networks replaced agricultural land. As vehicles multiplied and pollution levels increased, urban lifestyles became increasingly sedentary. The consumption of vegetables grown using excessive chemical inputs, combined with reduced physical activity, contributed to lifestyle-related diseases and declining overall health.

The COVID-19 pandemic became a turning point. It exposed vulnerabilities in food supply chains and pushed urban families to rethink their relationship with food, health, and self-reliance. This renewed awareness gave rise to a simple yet powerful question: Why should we remain only consumers of food when we can also become producers?

The Rise of Rooftop Gardens

Rooftop gardening emerged as an effective and practical solution for urban households. It allows families to grow their own fresh, toxin-free vegetables, leafy greens, and fruits using limited space. A rooftop garden transforms unused terraces into productive green spaces that support both physical and mental well-being.

Beyond food production, rooftop gardens play a vital role in environmental protection. They act as natural insulators, reducing indoor temperatures and lowering the heat absorbed by buildings during summer. This helps decrease energy consumption and contributes to a cooler urban environment. Rooftop gardens also improve air quality by absorbing pollutants and increasing oxygen levels, making cities healthier places to live.

Health, Wellness, and Mental Peace

Spending time among plants has proven psychological benefits. Gardening activities such as sowing, watering, composting, and weeding offer light physical exercise while reducing stress and anxiety. Watching plants grow nurtures patience, positivity, and a sense of accomplishment. Consuming vegetables harvested directly from one's own garden ensures better nutrition, freshness, and food safety—free from harmful chemical residues.

Thus, rooftop gardening **supports holistic health** by strengthening both the **body and the mind.**

Sustainable & Low-Cost Gardening Practices

Starting a rooftop garden does not require expensive materials. Discarded thermocol boxes, old containers, buckets, or water cans available at home can be repurposed for planting. Kitchen waste, such as vegetable peels and fruit scraps, can be composted to create natural fertiliser. Even everyday household practices—like using the water left after washing rice and lentils—can provide essential nutrients to plants.

Beginners can start with easy-to-grow leafy greens such as spinach, fenugreek, coriander, and amaranth, and gradually move on to vegetables like tomatoes, brinjal, chillies, gourds, and turmeric.

Natural Pest Management and Family Involvement

Pests and plant diseases in rooftop gardens can be effectively managed using natural solutions made from ginger, garlic, green chilli paste, sour buttermilk, and asafoetida. These remedies are safe, affordable, and environmentally friendly.

Involving children in rooftop gardening helps them develop a close relationship with nature from an early age. It teaches responsibility, patience, and awareness about healthy food habits—values that are essential for future generations.

Economic and Social Benefits

Rooftop gardens can also provide additional income opportunities. Homemakers can grow surplus vegetables, leafy greens, or turmeric using organic methods and sell them within their neighbourhoods. This not only reduces household expenses but also strengthens community-level food systems and women's financial independence.

Rainwater harvesting systems can be integrated into rooftop gardens, ensuring efficient water use and conservation—an important step toward sustainable urban living.

Growing Green for a Healthier Future

Rooftop gardens represent more than just a trend; they are a movement towards self-reliance, sustainability, and healthier living. By converting empty terraces into green spaces, urban households can reduce their environmental footprint, improve food quality, and reconnect with nature.

If we truly want greener surroundings, healthier families, and a secure future for coming generations, the answer lies close to home. Let us cultivate rooftop gardens in every household—not just as a source of food, but as a commitment to nature, health, and sustainable living.

The Dual-Nitrogen Synergy : How Ammonium Nitrate-Based NPK Fertilizers Maximize Crop Nitrogen Uptake Efficiency

By: Skyler Wang, Hubei Kailong Chuxing International Trading Co. Ltd.

About Author

Skyler Wang works at **Hubei Kailong Chuxing International Trading Co. Ltd.**

The company's core business covers NPK compound fertilizers and ammonium nitrate, closely tracks advances in fertilizer formulation science and crop nutrition, and is dedicated to delivering efficient, science-based fertilization solutions to customers worldwide.

Passionate Overseas Sales professional at **Hubei Kailong Chuxing,** driving global fertilizer trade with energy and dedication. **Committed to building** strong partnerships, delivering reliable solutions, and bringing creativity, resilience, and leadership to every challenge.

长江产业集团 YANGTZE RIVER INDUSTRY GROUP | 凯龙股份 KAILONG

I blend **industry expertise with innovation, aiming for sustainable growth, trust, and long-term win-win** cooperation across Southeast Asia, Africa, Australia, and beyond.

The Dual-Nitrogen Synergy :

Every farmer who works the land knows that nitrogen fertilizer is essential for crop growth. But few people pay attention to a subtle but crucial detail: even when two fertilizer products have identical NPK content, the actual amount of nitrogen that reaches the plant roots can differ significantly depending on the raw material used. For example, one product may derive its nitrogen from urea, while another uses ammonium nitrate—and the difference in crop response can be substantial.

The reason lies in the form of nitrogen. In an NPK compound fertilizer, N stands for nitrogen, P for phosphorus, and K for potassium. Most buyers focus solely on these three numbers. But the chemical form in which nitrogen is delivered to the soil matters just as much as the total amount—and in some cases, even more.

Ammonium nitrate (NH_4NO_3) is a unique nitrogen source. A single molecule of ammonium nitrate contains both ammonium nitrogen and nitrate nitrogen in a 50:50 ratio. This dual-nitrogen structure is not simply additive—it generates a genuine synergistic effect where the combined performance exceeds what either form could achieve alone. This article explains the science behind this synergy and its practical implications for agricultural production.

Ammonium vs. Nitrate: Two Nitrogen Forms with Fundamentally Different Personalities

Inorganic nitrogen available to plants in soil exists primarily in two forms: ammonium (NH_4^+) and nitrate (NO_3^-). Both supply nitrogen to crops, but they behave very differently in the soil, are absorbed by roots through different mechanisms, and follow distinct metabolic pathways once inside the plant.

Ammonium carries a positive charge. In practical terms, it is readily adsorbed onto negatively charged soil colloids-think of it as the soil "grabbing hold" of ammonium ions. This means ammonium does not move easily with water, making it resistant to leaching. That is an advantage. However, under alkaline soil conditions or at high temperatures, ammonium can volatilize as ammonia gas (NH_3), essentially evaporating into the air and becoming a pure waste of fertilizer money. Once absorbed by the plant, ammonium must be assimilated directly in root cells, which consumes considerable energy-and excessive ammonium accumulation can actually be toxic to the plant.

Nitrate carries a negative charge. Being similarly charged as soil colloids, nitrate is repelled rather than held-it remains highly mobile in soil water, traveling quickly toward root surfaces. This makes nitrate readily available for uptake, but it is equally susceptible to being washed away by heavy rainfall or excessive irrigation. Inside the plant, nitrate must first be converted back to ammonium by the enzyme nitrate reductase-a process powered by sunlight and occurring primarilyin the leaves—before it can be assimilated.

An analogy might help: ammonium is like a "cautious" worker—stable but slow to act; nitrate is like an "agile" worker—fast-acting but prone to being lost. When a plant receives only one type, trade-offs are inevitable. Ammonium nitrate, by providing both simultaneously, gives the plant the best of both worlds.

The Synergistic Mechanism: Why Does Dual Nitrogen Supply Deliver More Than the Sum of Its Parts ?

The ammonium nitrate molecule delivers ammonium and nitrate in equal proportions. Extensive agricultural research has confirmed that when both forms are available simultaneously, total nitrogen uptake by the plant significantly exceeds what is achieved by supplying either form alone at equivalent rates. This is the synergistic effect.

The underlying mechanism is fascinating. When roots absorb ammonium, they release hydrogen ions (H^+), acidifying the soil immediately surrounding the roots—the rhizosphere. When roots absorb nitrate, they release hydroxide ions (OH^-) or bicarbonate ions (HCO_3^-), which have an alkalizing effect. When both nitrogen forms are supplied together, these two opposing effects buffer each other, maintaining rhizosphere pH close to neutral.

Why does stable rhizosphere pH matter so much? Because the availability of phosphorus, zinc, manganese, and other micronutrients is highly sensitive to soil acidity. When soil becomes too acidic or too alkaline, these essential nutrients become chemically "locked" in forms that plant roots cannot absorb..

..The dual-nitrogen buffering effect of ammonium nitrate keeps the rhizosphere environment balanced, indirectly improving the bioavailability of these nutrients and amplifying the overall effectiveness of the entire fertilizer program.

Furthermore, excessive uptake of a single nitrogen form can be harmful to plants. Too much ammonium can inhibit calcium and potassium uptake, while excess nitrate can lead to accumulation of organic acids in plant tissues. The dual-nitrogen approach gives plants the flexibility to modulate the ratio of two absorption pathways according to their immediate needs, effectively mitigating the risks associated with any single nitrogen source.

Where Ammonium Nitrate-Based NPK Formulations Outperform ?

Understanding the science, let us now examine the real-world agricultural scenarios where ammonium nitrate-based NPK fertilizers hold clear advantages over urea-based or ammonium chloride-based products.

Scenario 1: Early-season planting under cool conditions.

In early spring when soil temperatures remain low, soil microorganisms are still largely dormant. If urea-based NPK is applied, the urea must first be hydrolyzed by microorganisms before plants can access the nitrogen—a process that is extremely slow in cold soil. Ammonium nitrate-based NPK delivers nitrate directly, bypassing the need for microbial transformation entirely. Plants can absorb and utilize it immediately. This advantage is critical for early-spring crops in temperate regions and winter-grown crops in the Southern Hemisphere.

Scenario 2: Chloride-sensitive crops.
Tobacco, grapevine, potato, strawberry, and citrus are among the crops highly sensitive to chloride ions. The use of ammonium chloride-based NPK fertilizers on these crops can significantly degrade product quality—tobacco may develop an unpleasant taste, grape sugar content may decline, and potato starch quality may suffer. Ammonium nitrate provides a completely chloride-free nitrogen source, making it the preferred choice for these chloride-sensitive crops.

Scenario 3: Drip irrigation and fertigation systems
Modern agriculture increasingly relies on drip irrigation for precision nutrient delivery. Ammonium nitrate's excellent water solubility allows it to dissolve readily with phosphorus and potassium fertilizers, forming clear liquid solutions that do not clog drip emitters. Meanwhile, the rapid availability of nitrate nitrogen enables highly responsive nutrient management—delivering exactly what the crop needs, precisely when it needs it.
It is worth noting that in scenarios requiring large nitrogen applications—such as basal fertilization for flooded rice paddies—a blended approach combining ammonium nitrate with urea can also be effective and economical. Urea provides slow-release ammonium nitrogen, while ammonium nitrate supplies immediately available nitrate, together ensuring both early-season rapid response and sustained nitrogen supply throughout the growing cycle.

Safety Considerations: Handling Ammonium Nitrate Responsibly

Any discussion of ammonium nitrate's agricultural value would be incomplete without addressing its safety requirements. As a strong oxidizing agent, ammonium nitrate poses explosion risks under conditions of high temperature, confinement, or contact with organic materials. Countries worldwide have enacted strict legislation governing the production, transportation, storage, and application of ammonium nitrate fertilizers.

For fertilizer traders and farmers, the most important practices are strict compliance with local regulations and maintaining the following standards: storage facilities must be well-ventilated and kept away from heat sources and combustible materials; ammonium nitrate must never be stored alongside organic substances; and transportation requires protection against direct sunlight, moisture, and physical impact.
When handled according to these guidelines, ammonium nitrate-based fertilizers are both safe and highly effective agricultural inputs.

Conclusion

Choosing the right fertilizer involves far more than comparing NPK numbers. The form in which nitrogen is delivered can make or break the actual effectiveness of a product.

The dual-nitrogen architecture of ammonium nitrate—through the synergistic interplay of ammonium and nitrate—stabilizes the rhizosphere soil environment, enhances micronutrient availability, and demonstrates distinct advantages under cool temperatures, for chloride-sensitive crops, and in fertigation systems.

For farmers and agri-input professionals alike, understanding these scientific principles enables more informed and rational fertilizer decisions—reducing costs, improving yields, and minimizing environmental impact. Scientific fertilization begins with choosing the right nitrogen source.

From Climate-Smart Farming to Trust-Smart Agriculture: Why the Future of Food Depends on Evidence

By Theresa Van der Walt | Co-Founder & CEO, Terra Vita Global B.V.

About Author

Theresa van der Walt is Co-Founder & CEO of Terra Vita Global B.V., a Netherlands-based governance architecture practice working at the intersection of sustainable agriculture, climate resilience, field evidence, MRV, and institutional review systems. Terra Vita Global develops the Terra Vita Hub and FieldTrace evidence route to help connect field reality with accountable programme governance.

Sustainable agriculture must be practical for farmers, credible for institutions, and meaningful for communities.

Agriculture has always been more than food production. It is culture, livelihood, land stewardship, family security and national resilience. Today, farmers are being asked to carry an even heavier responsibility: produce nutritious food, protect soil and water, reduce emissions, withstand climate shocks, and prove that every action can be trusted by markets, governments and funders.

This is why the next stage of global agriculture must move beyond climate-smart farming alone. It must also become trust-smart agriculture.

Climate-smart agriculture is often described through three goals: increasing productivity, strengthening resilience and reducing greenhouse gas emissions where possible. These goals are important, but farmers and rural communities know that transformation does not happen through slogans. It happens through daily decisions: when to plant, how to protect soil moisture, which seeds to use, how to manage grazing, how to restore degraded land, how to document water use, and how to show that work was actually done.

The world urgently needs this shift. The State of Food Security and Nutrition in the World 2025 estimated that hundreds of millions of people still faced hunger in 2024, while about one-third of the global population could not afford a healthy diet. Climate shocks, high input costs, land degradation and water stress are making agriculture more difficult in many regions. Farmers are often on the front line of the climate crisis.

But farmers are also on the front line of the solution. Regenerative farming, agroforestry, water-smart irrigation, improved livestock systems, soil cover, crop diversification, local seed resilience, coastal restoration, and better post-harvest systems can all help rebuild food security. The question is no longer only: "What works ?"

The question is also: "How do we prove it, protect it, finance it and scale it fairly ?"

This is where evidence becomes as important as innovation

Many good agricultural projects fail to attract long-term support because the evidence chain is weak. A farmer may be improving soil health, but the data is not recorded. A community may be restoring land, but the boundary is not clear. A cooperative may be reducing water stress, but field activity is not linked to finance conditions. A programme may be delivering climate benefits, but the documentation is too scattered for review.

In the past, this gap was treated as an administrative problem. In reality, it is a trust problem.

If agriculture is to receive more climate finance, blended finance, donor funding and institutional investment, then field reality must be visible, attributable and reviewable. Funders need to know what is happening. Communities need to know that their work is recognised. Governments need evidence that programmes align with policy. Farmers need systems that do not bury them in paperwork but still protect the integrity of their work.

Trust-smart agriculture means building this evidence layer around the farmer, not on top of the farmer.

Practical evidence pathway

Farmer action>Field record>Reviewer check>Funding confidence>Stronger food system

Sustainable agriculture must be practical for farmers, credible for institutions, and meaningful for communities.

For example, a smallholder group may introduce drought-resilient crops and soil cover practices. A field officer records the activity with location, date, photos and farmer identity. The cooperative or programme manager reviews the evidence. A technical reviewer checks whether the activity matches the agreed plan. A funder or government partner can then see that the project is not just a promise, but a documented process.

This does not mean replacing human judgement with technology. It means giving human judgement better evidence. Farmers understand their land in ways that no satellite, dashboard or report can fully capture. However, when local knowledge is combined with transparent records, it becomes easier to protect farmers from unfair doubt, reward real progress, and identify where help is needed.

Evidence also helps reveal misalignment early. If a project promises mangrove restoration but field records show work outside the agreed boundary, the system should raise a signal. If a programme claims farmer training but attendance, materials and follow-up visits are missing, the gap should be visible. If funding is linked to milestones, then the evidence should show whether those milestones are complete, delayed or at risk.

This is not about punishment. It is about course correction.

In strong agricultural systems, escalation should not be seen as failure. It should be seen as protection. A missing water permit, unclear land right, delayed seed supply or incomplete field visit can be addressed early if the signal is visible. When problems are hidden until the end of a project, everyone loses.

The future of agriculture will require a new partnership between field practice and governance. Farmers and communities bring action. Agronomists and local organisations bring technical support. Governments bring policy authority. Funders bring capital. Digital tools bring traceability. Independent reviewers bring confidence. None of these actors should replace the others. The value lies in connecting them clearly.

This is especially important for smallholder farmers, women producers, youth-led agriculture and rural cooperatives. These groups often deliver real value but are excluded from formal finance because evidence is fragmented or informal. A better evidence system can help make their work visible without forcing them into complicated institutional language.

The same applies to climate and nature outcomes. Soil restoration, water retention, carbon benefits, biodiversity recovery and livelihood improvement cannot be managed through one photo or one report at the end of a project. They require a living record over time: what changed, who contributed, what risks appeared and what decisions were made.

Global agriculture does not only need more investment. It needs more investable trust.

For KhetiValah's vision of a wealthier and healthier world, this message is powerful: sustainable agriculture must be practical for farmers, credible for institutions and meaningful for communities. A healthier world begins in the field, but it must be carried through systems that honour the field.

Trust-smart agriculture is the bridge between local farming effort and global food security. It allows the world to see not only what farmers produce, but also the resilience, knowledge and stewardship behind that production.

The next agricultural revolution may not start with a new machine. It may start with a simple promise: when farmers restore land, protect water and grow food under difficult conditions, the world must be able to see it, trust it and support it.

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Rural Heart Beat

Rural Service Centres-By the Rural, of the Rural, and for the Rural

Villages are gradually turning into old-age homes, increasingly inhabited by the elderly, while able-bodied youth migrate to cities regardless of their education or skill levels. Urban areas continue to attract them with promises of better job opportunities and improved living facilities.

This raises a critical question: how can we bring urban-like facilities into rural areas so that rural youth are retained and sustainably engaged within their own communities?

Urban areas today are saturated with e-commerce services—covering food delivery, groceries, transportation, and household maintenance. Extending these services to rural regions could be transformative. Establishing rural service centers across clusters of villages can create employment opportunities for local youth, provide essential services to communities, generate markets for rural products, and ensure access to urban goods at affordable prices. Such initiatives would significantly enhance the vibrancy of rural life and help attract, retain, and sustain rural youth.

A practical starting point is the expansion of urban-based e-commerce platforms into rural contexts—concepts such as "Rural Amazon," "Rural Uber," or "Rural OYO"—customized to suit the rural ecosystem. Additional services such as rural courier networks, custom hiring centers, agri-processing and packaging units, agricultural input supply systems, and emergency services like ambulances can greatly improve the quality of rural life. These platforms can deliver quality goods and services at affordable prices directly to households, while also enabling the provision of skilled services within rural communities. Leveraging existing, time-tested platforms can help initiate this transformation effectively.

Integrating rural entrepreneurs—such as farmers, shop owners, and service providers—into unified local service platforms can help them scale and innovate. The size and scope of these service networks can be tailored to the size and needs of village clusters. These village clusters can act as hubs for government service delivery through digital platforms and local support, while also enabling more effective implementation of private-sector CSR initiatives.

However operationalizing these ideas faces challenges such as shifting mindsets, building trust in digital transactions, ensuring affordability, improving skills and business discipline, enhancing digital literacy, addressing connectivity issues, and managing resistance from existing service providers. Despite these obstacles, taking the first step is essential.

Importantly, the goal is not to urbanize rural areas, but to make urban-quality services accessible within rural settings. This can be achieved by investing in both people and the planet, promoting green jobs, strengthening markets for rural products, and enabling the retention, retraining, and sustainable engagement of rural youth.

Realizing this vision will require bold initiatives from the private sector, supported by proactive policies and sustained commitment from the government.
With thoughtful implementation and local customization, this model has the potential to redefine rural development in a sustainable and inclusive manner.
Galepu Mindfulness city project of Bhutan is a dream roadmap for entire Asia and Pacific. Wish the project, a grand success.

With Warm Wishes

Dr. P. Chandra Shekara

Director General, CIRDAP

Cultivating Green Leaders: CIRDAP Supports Youth Empowerment at the Philippine Forestry Youth Summit 2026

In alignment with the 2026 International Day of Forests theme, "Forests and Economies," the Philippine Forestry Youth Summit (PFYS) 2026 held from 21 to 23 March 2026 at the University of the Philippines Los Baños. This three day interactive event brings together high school, undergraduate, and graduate students from across the Philippines who share a passion for forestry, environment, and sustainable development.

Anchored on the theme "YABONG: Empowering Philippine Forests as Engines of a Green and Inclusive Economy," the summit aims to strengthen youth understanding of forests as both vital ecosystems and key drivers of resilient and inclusive economies. Recognizing young people as essential stakeholders in the forestry sector, PFYS 2026 provides a platform for participants to engage with forestry professionals, critically examine current challenges, and propose innovative solutions that place forests at the core of sustainable development.

The summit advances several Sustainable Development Goals, including SDG 4 (Quality Education) by promoting inclusive learning, SDG 8 (Decent Work and Economic Growth) by preparing youth for meaningful careers in forestry, SDG 11 (Sustainable Cities and Communities) by highlighting the role of forests in building resilience, SDG 13 (Climate Action) through climate mitigation and adaptation efforts, and SDG 17 (Partnership for Goals) by fostering multi sectoral collaboration.

CIRDAP is proud to support the Plenary Session titled "Forests as Engines of a Green and Inclusive Economy." Through engaging plenary sessions, workshops, competitions, and institutional tours, the summit equips participants with essential technical knowledge, research skills, and leadership competencies. It serves as a dynamic space for knowledge exchange, innovation, and networking among students, professionals, and forestry related institutions.

Forests are more than serene landscapes. They are lifelines that sustain communities, protect biodiversity, and drive pathways toward a sustainable and inclusive future. As the world navigates urgent environmental challenges and shifts toward greener economies, forests stand at the heart of resilience, development, and shared prosperity.

The future of forests depends on those who choose to protect and value them. CIRDAP is honored to join in empowering the next generation of forest stewards, helping shape a greener and more inclusive future for all.

Bhutan's Blueprint for Wellbeing: Highlights from the CIRDAP Knowledge Series Webinar on Green National Happiness

CIRDAP hosted an enlightening session as part of its Knowledge Series 54, focusing on the visionary concept of Gross National Happiness (GNH) and its successful operationalization in Bhutan held on March 16th, 2026.
The webinar featured Her Excellency Dasho Karma Hamu Dorjee, Ambassador of Bhutan to Bangladesh, who shared profound insights into how Bhutan prioritizes holistic progress over purely economic metrics.

Key Takeaways from the Webinar -

The discussion centered on the philosophy that sustainable development must balance material growth with spiritual and emotional wellbeing. Here are the core elements discussed:

The Origins of GNH: Coined by His Majesty the Fourth King of Bhutan in the 1970s, GNH challenges the traditional GDP model by giving equal weight to non economic aspects of life.

The Four Pillars: The framework stands on Good Governance, Sustainable Socio Economic Development, Cultural Preservation, and Environmental Conservation. A Scientific Approach: Bhutan uses the Alkire Foster method to track progress through a single number index across 33 indicators.
The Nine Domains of Wellbeing: To ensure a "good life" for its citizens, Bhutan measures psychological wellbeing, health, education, time use, cultural diversity, good governance, community vitality, ecological resilience, and living standards.

The session was chaired by H E Dr. P Chandra Shekara, Director General of CIRDAP, and active participation from experts across CIRDAP Member Countries. This exchange of knowledge reinforces our commitment to finding innovative, people centered approaches to rural development.

CIRDAP-NIRDPR Collaborative International Training Programme on Geo-Informatics Applications in Rural Development at NIRDPR, Hyderabad, India

The Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP), in collaboration with the National Institute of Rural Development and Panchayati Raj (NIRDPR), successfully organized the International Training Programme on "Geo-Informatics Applications in Rural Development" (30 March to 04 April 2026) at NIRDPR, Hyderabad.

The programme was funded by the Ministry of Rural Development, Government of India. The inaugural session was graced and formally welcomed by HE. Dr. P. Chandra Shekara, Director
General of CIRDAP.

The programme brought together 17 distinguished participants from CIRDAP Member Countries including Bangladesh, Fiji, India, Lao PDR, Myanmar, Nepal, Sri Lanka, and Vietnam, along with representatives from NIRDPR and CIRDAP.

The training programme emphasized the application of geo-spatial technologies, including Remote Sensing (RS), Geographic Information Systems (GIS), and Global Positioning System (GPS), in rural development planning and implementation. Participants actively engaged in knowledge-sharing sessions, country presentations, and interactive discussions focusing on integrating geoinformatics into policy frameworks and practical interventions to advance sustainable rural development and achieve the Sustainable Development Goals (SDGs).

As part of the programme, participants undertook different field visits such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Rural Technology Park (RTP). These visits provided valuable insights into innovative agricultural practices and rural technologies. Group work sessions were conducted following the visits, enabling participants to reflect on their learning and explore practical applications in their respective country contexts.

This initiative underscores CIRDAP's continued commitment to strengthening regional cooperation, enhancing institutional capacities, and promoting innovative technological approaches for inclusive and sustainable rural transformation across its member countries.

Key Recommendations of National Conference on Transforming Rural Livelihood Landscape in India: Empowering Rural Communities through Investing in Planet, People and Prosperity (3Ps)

The conference was jointly organized by the Institute of Livelihood Research and Training (ILRT) and the Participatory Rural Development Initiative Society (PRDIS) in association with ICAR –NAARM and other reputed government, corporate and non-government organizations including FAO and CIRDAP on 19–20 February 2026 at Hyderabad, India.
The Conference brought together over 300 stakeholders to share experiences, academic insights, and practice-driven solutions on livelihood that also align with the SDGs and the India's Vision of 2047.

Key Recommendations:

Emerging from 10 thematic recommendation clusters:

- Ecological Foundations: Scale regenerative agriculture, climate-smart NRM, agroforestry & circular economy models as core livelihood infrastructure
- Strengthen Institutions: Scale SHGs, FPOs & cooperatives; embed Gender Resource Centers within NRLM; improve governance & professional management
- Financial Inclusion: Move from account access to active usage; scale Sakhi community intermediary models; design seasonal & climate-responsive financial products
- Technology & Innovation: Leverage AI, fintech & blockchain via assisted digital models; bridge academia-industry-community innovation ecosystems
- Youth & Enterprise: Create agri-entrepreneurship pathways (AC&ABC model); restore economic viability & social dignity to the farming profession
- Evidence & Convergence: Align NRLM, NABARD, state programmes & CSR through 3Ps framework; institutionalize action research & knowledge platforms

Dr. P. Chandra Shekara, Director General of CIRDAP. Delivering Key Note Address

Dignitaries On the Dais

The landmark outcome of the conference was the release of the Hyderabad Livelihood declaration with a sincere appeal to all GO/ NGOs, national/ international institutions, CSR bodies & community groups to adopt a cluster of villages and pilot the 3Ps recommendations towards transforming Rural Livelihood Landscape in India.

IRD Model 19: Digital Market Linkages Transforming Coastal Livelihoods the Aruna Experience in Indonesia

Aruna, a transformative Indonesian ecommerce startup founded in 2016, demonstrates how digital innovation can reshape rural livelihoods and strengthen coastal economies. Aruna connects small scale fishers directly to national and international markets, reducing dependence on middlemen and enabling fairer income distribution within fishing communities.

Operating through a digital platform and a network of local processing units known as miniplants, Aruna integrates technology with grassroots supply chains. Fishers use mobile applications to report catches, receive real time pricing, and coordinate directly with processing centers. This system ensures that pricing is based on catch weight and quality standards, promoting transparency and trust between producers and buyers.

A key feature of Aruna's model is its emphasis on quality assurance and post harvest handling. The miniplants are equipped with freezing and packaging technologies that preserve freshness and meet export requirements. This enables small scale fishers to access high value domestic and international markets that were previously out of reach. At the same time, improved logistics and streamlined supply chains contribute to lower consumer prices, making seafood more affordable for end users.

The impact of Aruna's approach is visible in regions such as Konawe and other coastal areas across Indonesia. The model has generated multiple socio economic benefits:

1. Improved livelihoods through fair and standardized pricing, leading to increased fisher income
2. Reduced consumer costs by approximately fifteen percent due to efficient supply chain management
3. Enhanced market access for small scale producers through digital connectivity
4. Strengthened quality control through modern processing, freezing, and packaging systems
5. Promotion of sustainable fishing practices and coastal resource management
6. Increased transparency and traceability in seafood supply chains

Beyond economic gains, Aruna contributes to environmental sustainability by encouraging responsible fishing practices and supporting traceable seafood products. This alignment with sustainability principles ensures long term viability of marine resources while maintaining market competitiveness.

Aruna's integrated approach illustrates how digital platforms can bridge rural producers with global markets while fostering inclusive growth. By combining technology, infrastructure, and community engagement, the initiative empowers coastal fishers to participate more effectively in the global maritime economy.

CIRDAP Knowledge Series 53: Webinar on Green Building Infrastructure in Rural Development

CIRDAP successfully organized a webinar on Green Building Infrastructure in Rural Development, on Thursday, 5 March 2026, as part of the CIRDAP Knowledge Series 2026.

The webinar was jointly organized by CIRDAP, Non Aligned Movement Centre for South South Technical Cooperation (NAM CSSTC) and Universitas Gadjah Mada Indonesia.

The session featured two distinguished speakers from Universitas Gadjah Mada Indonesia. Dr. Rachmawan Budiarto, Manager of the Centre for Development of Smart and Green Building, and Dr. Sentagi Sesotya Utami, Director of the Centre for Development of Smart and Green Building, shared valuable insights on the role of green infrastructure in advancing sustainable rural development.

The speakers highlighted key principles of green building, including energy efficiency, renewable energy adoption, environmentally responsible construction practices, and sustainable infrastructure planning for rural communities. The discussion also emphasized how green infrastructure can help address environmental risks associated with rural development, such as land degradation, deforestation, water pollution, and climate vulnerability.

Through practical experiences, case studies, and best practices, the webinar explored strategies for planning, implementing, and maintaining green infrastructure in rural areas. The session also identified important challenges and opportunities for scaling up green building initiatives to promote resilient and sustainable rural communities.
The webinar was attended by Dr. Ganga Dutta Acharya, Director Research of CIRDAP, along with experts and participants from CIRDAP Member Countries. The event concluded with an engaging interactive session, allowing participants to exchange ideas and discuss the potential of green building infrastructure in supporting sustainable rural development.

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Are you empowering communities, fighting poverty, tackling climate change, or improving access to essential services ?
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Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) in collaboration with Rural Economic and Educational Development Society (REEDS), presenting this prestigious platform celebrates groundbreaking rural solutions from across the Asia-Pacific region.

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What We're Looking For

Innovations that address critical rural challenges such as:
Poverty & livelihood development, Inequality & social inclusion, Climate resilience & sustainability, Access to education, health, and essential services, Community-led transformation

TattvaVedika

FROM ALGORITHMS TO AWARENESS

INTELLIGENCE | ETHICS | DIALOGUE | HUMANITY

BUILDING A GLOBAL PLATFORM FOR CONSCIOUS DIALOGUES IN ARTIFICIAL INTELLIGENCE

A KHETIVALAH DIALOGUES INITIATIVE FOR ESSENTIAL CONVERSATIONS IN AI AND BEYOND

Artificial intelligence is rapidly reshaping the world. From healthcare and education to agriculture, governance, business, climate action, and human communication, AI is emerging as one of the most transformative forces of our time. Yet, as technological progress accelerates, an equally important question is being raised across societies:
Are we advancing intelligence faster than wisdom?
While conversations around artificial intelligence often focus on innovation, automation, productivity, and disruption, deeper questions surrounding ethics, responsibility, trust, inclusivity, human values, and long-term societal impact continue to demand greater attention. Increasingly, there is a global realization that AI cannot be understood solely as a technological development. It must also be explored through ethical, philosophical, social, cultural, and human lenses.

Recognizing the urgent need for more meaningful and interdisciplinary engagement, **KhetiValah Dialogues** is launching **TattvaVedika (तत्त्व वेदिका / తత్త్వ వేదిక)**, a global initiative designed to foster conscious conversations on artificial intelligence and beyond.
Derived from the Sanskrit words *Tattva*, meaning "essence of truth," and *Vedika*, meaning "platform for discourse," TattvaVedika represents a space where inquiry meets wisdom and innovation meets responsibility. Inspired by the spirit of ancient Indian *Vedikas*, where thinkers, scholars, and seekers gathered to exchange perspectives and reflect deeply on questions of knowledge and existence, the initiative seeks to revive meaningful dialogue for a rapidly changing technological age.

At its core, TattvaVedika aims to explore not only ***what artificial intelligence can do*, but also *what it should do, why it matters, and how it can evolve responsibly for humanity*.**

INTELLIGENCE | ETHICS • DIALOGUE | HUMANITY

Vision & Mission

Guided by purpose. Driven by dialogue. Committed to humanity.

VISION

The vision of TattvaVedika is to establish a globally respected platform for essential dialogues that examine intelligence beyond algorithms and technology.

It seeks to bring together diverse voices to explore how artificial intelligence can evolve in ways that are ethical, inclusive, sustainable, and deeply human.

Its mission is to create a collaborative global ecosystem where experts, researchers, innovators, educators, policymakers, philosophers, practitioners, and changemakers come together.

It aspires to contribute to a future where technology serves humanity, dialogue fosters understanding, and collective intelligence empowers a more ethical, compassionate, and enlightened world.

MISSION

Institutions can engage in thoughtful discussions on the opportunities, challenges, and responsibilities emerging from AI.

Rather than functioning as another technology webinar series, TattvaVedika intends to nurture reflective dialogue where interdisciplinary perspectives are encouraged and meaningful inquiry is valued alongside innovation.

The initiative is built on a simple belief: intelligence becomes truly meaningful when guided by wisdom, ethics, and shared human responsibility.

TattvaVedika aims to explore not only what artificial intelligence can do, but also *what it should do, why* it matters, and how it can evolve responsibly for humanity.

Let us collectively shape conversations where intelligence meets wisdom, innovation meets responsibility, and technology serves humanity.

LAUNCHING

Global Dialogues from July 2026

Beginning in July 2026, TattvaVedika will launch a series of weekly global virtual sessions every Wednesday in English, bringing together participants and thought leaders from across countries and disciplines.

GLOBAL PARTICIPATION
Voices from across countries and cultures.

DIVERSE PERSPECTIVES
Bridging disciplines and ideas for a better future.

WEEKLY SESSIONS
Every Wednesday in English.

VIRTUAL PLATFORM
Accessible. Interactive. Impactful.

WEEKLY SESSIONS
EVERY WEDNESDAY
BEGINNING JULY 2026

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Endless dialogues. Transformative futures.

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Join the global dialogue.
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Each session will focus on carefully curated themes surrounding artificial intelligence, emerging technologies, ethics, sustainability, governance, education, social impact, and humanity's evolving relationship with intelligence.

Topics may include responsible AI, human-centered technology, digital trust, AI governance, future workplaces, education in the AI era, AI and sustainability, climate resilience, philosophy of intelligence, ethical innovation, and sector-specific applications including agriculture and food systems.

The objective is not merely to discuss technology, but to create deeper understanding around its implications and possibilities.

A GLOBAL PLATFORM. DIVERSE VOICES. MEANINGFUL IMPACT.

Global Speakers Invited | Share. Inspire. Transform.

TattvaVedika invites voices from across disciplines and geographies to contribute to essential dialogues on AI and beyond.

GLOBAL REACH
Connect with diverse audiences across countries and cultures.

MEANINGFUL DIALOGUE
Engage in thoughtful conversations that explore ideas, ethics, and humanity.

SHARE YOUR EXPERTISE
Present your insights, research, and real-world experiences to a global community.

DRIVE IMPACT
Contribute to solutions that shape a more ethical and sustainable future with AI.

WHO CAN SPEAK?
- AI Experts & Researchers
- Academics & Professors
- Industry Leaders
- Policymakers & Thinkers
- Philosophers & Ethicists
- Innovators & Entrepreneurs
- Social Impact Leaders
- Students & Young Voices

GLOBAL VIRTUAL SESSIONS
EVERY WEDNESDAY
STARTING JULY 2026

INFORM
Exchange ideas and perspectives.

INSPIRE
Learn from diverse experiences and wisdom.

COLLABORATE
Build connections that create lasting change.

One Global Platform. | Endless Conversations. Transformative Futures.

Knowledge Partner Invitation: Building a Global Ecosystem

To ensure global credibility and intellectual depth, TattvaVedika will actively invite knowledge partners from across the world.

The initiative seeks collaborations with universities, research institutions, AI laboratories, think tanks, innovation ecosystems, incubators, accelerators, technology councils, international organizations, academic networks, ethical AI forums, policy institutions, sustainability organizations, and sector-specific bodies working on AI applications.

Knowledge partners will contribute through expert participation, collaborative sessions, institutional outreach, thematic guidance, research perspectives, and cross-border knowledge exchange.

By bringing together organizations from multiple regions and sectors, TattvaVedika seeks to ensure that conversations around AI reflect global diversity rather than a single regional narrative.

Advisors & Moderators: Guiding Meaningful Conversations

To strengthen the quality and direction of the initiative, TattvaVedika plans to establish an international network of advisors and moderators.

Advisors may include distinguished academicians, AI researchers, senior technology leaders, governance specialists, ethical AI experts, sustainability thinkers, policy professionals, philosophers, and interdisciplinary scholars who can help guide the initiative strategically and intellectually.

Moderators will play an equally important role in shaping discussions. Rather than simply hosting sessions, moderators will facilitate balanced, reflective, and engaging conversations that encourage meaningful exchange between speakers and audiences.

This structure aims to ensure that every TattvaVedika dialogue remains thoughtful, inclusive, and future-focused.

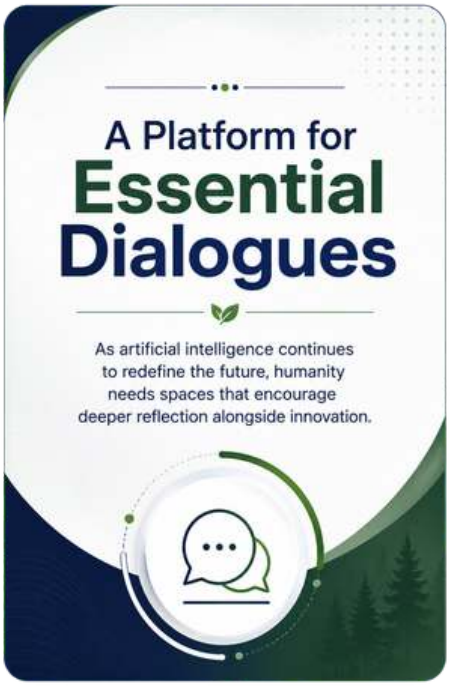
Designed as a global thought-leadership publication

TattvaVedika Magazine will feature expert articles, keynote insights, interviews, reflective essays, institutional perspectives, speaker contributions, and emerging ideas generated through dialogues and collaborations.

Unlike conventional technology publications focused primarily on products or market trends.

TattvaVedika Magazine aims to create a deeper intellectual space for meaningful discourse around intelligence, responsibility, ethics, sustainability, policy, philosophy, and human-centered innovation.

The publication will welcome contributions from global experts, universities, researchers, startups, policy institutions, ethical AI practitioners, innovators, and interdisciplinary professionals across sectors.



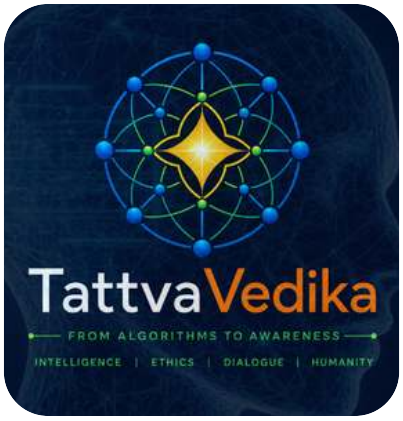
Its purpose is not only to document conversations, but to democratize knowledge, making complex AI discussions more accessible and relevant for students, educators, entrepreneurs, researchers, professionals, policymakers, and curious global readers.

TattvaVedika does not seek simply to discuss AI.
It seeks to build understanding around it.

By bringing together global voices where technology meets ethics, intelligence meets awareness, and innovation meets responsibility, KhetiValah Dialogues aspires to position TattvaVedika as a meaningful platform for essential conversations in AI and beyond.

Because the future of intelligence should not only be powerful.

It should also be thoughtful, inclusive, responsible, and deeply human.



MAY 2026 - GLOBAL AGRI DEVELOPMENTS

FAO, CGIAR & GLOBAL PARTNERS SCALE AI INVESTMENTS FOR CLIMATE-SMART AGRICULTURE

Field Focus:

Artificial Intelligence is increasingly moving from pilot projects to large-scale agricultural systems as global institutions strengthen digital agriculture partnerships.

In 2025–26, the Food and Agriculture Organization (FAO) and CGIAR expanded collaborations with governments, research institutions, and agri-tech innovators to accelerate AI-powered farm advisory systems, pest surveillance, and climate-risk forecasting.

CGIAR's newly strengthened AI Hub in Abu Dhabi, launched through the UAE–Gates Foundation partnership, aims to convert decades of agricultural research data into practical AI tools for real-world farming decisions.

The momentum is supported by growing public-private investment ecosystems.

According to FAO, as of early 2025 there were 449 ongoing digital agriculture initiatives globally, with nearly 89% focused on farm management systems, reflecting growing institutional investment in precision agriculture, digital extension, and climate adaptation.

The World Economic Forum's AI4AI Initiative has also set a target to support 10 million farmers by 2030, including at least 30% women farmers, through digital agriculture partnerships and AI-enabled advisory systems.

These efforts are expected to improve farm-level decision-making, reduce input inefficiencies, strengthen climate resilience, and improve productivity, particularly for smallholder farmers facing rising production risks.

Source

Food and Agriculture Organization (FAO); CGIAR AI Hub; World Economic Forum AI4AI Initiative; global digital agriculture reports.

AGRI FACTS

- AI-based crop imaging can detect nutrient deficiencies and disease symptoms several days before they become visible to farmers.
- Pollinators influence nearly 75% of globally important food crops, making biodiversity conservation central to food security.
- Climate change is gradually shifting crop suitability zones, forcing adaptation in crop selection and farming practices worldwide.

GLOBAL DAIRY SECTOR EXPANDS METHANE REDUCTION PARTNERSHIPS IN LIVESTOCK SYSTEMS

Field Focus:

Major food companies are increasing investments in regenerative agriculture as part of long-term sustainability and climate strategies.

In 2025–26, companies including PepsiCo, Nestlé, Danone, and Cargill expanded farmer partnerships focused on soil health, biodiversity, water efficiency, and carbon-smart farming practices.

PepsiCo reported progress toward its target of supporting regenerative agriculture across 7 million acres globally by 2030, while Nestlé continues investments under its sustainable sourcing programs to support lower-emission food supply chains.

Several initiatives involve collaborations with research organizations, farmer groups, and agri-service providers to strengthen adoption of cover cropping, reduced tillage, and nutrient efficiency practices.

These investments are expected to improve soil productivity, reduce environmental risks, and strengthen long-term farm resilience.

Agricultural economists increasingly view regenerative agriculture as both a climate strategy and an economic investment in supply chain stability.

Source

PepsiCo sustainability reports; Nestlé regenerative agriculture updates; World Economic Forum food system reports; regenerative agriculture research institutions.

AGRI FACTS

- Livestock manure, when scientifically processed, becomes a valuable nutrient recycling resource, reducing chemical fertilizer dependence.
- Biofortified crops enriched with zinc, iron, and vitamin A are increasingly used to address hidden hunger and micronutrient deficiencies.
- Precision agriculture technologies can reduce fertilizer use by 15–30% while improving productivity and nutrient-use efficiency.

GLOBAL INVESTMENT IN REGENERATIVE AGRICULTURE ACCELERATES ACROSS FOOD SUPPLY CHAINS

Field Focus:

Artificial Intelligence is increasingly moving from pilot projects to large-scale agricultural systems as global institutions strengthen digital agriculture partnerships.

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Source

Food and Agriculture Organization (FAO); CGIAR AI Hub; World Economic Forum AI4AI Initiative; global digital agriculture reports.

AGRI FACTS

- Global food loss and waste contribute nearly 8–10% of greenhouse gas emissions, making food waste reduction a climate strategy.
- Soil microorganisms influence nutrient cycling, crop immunity, and carbon storage, making soil biology as critical as soil chemistry.
- Controlled-environment agriculture can produce vegetables with significantly higher resource efficiency and lower water consumption than open-field systems.

WORLDFISH AND ASIAN GOVERNMENTS EXPAND CLIMATE-RESILIENT AQUACULTURE INVESTMENTS

Field Focus:

Climate-resilient aquaculture is receiving stronger institutional support as governments and international organizations work to improve sustainable fish production and food security.

In 2025–26, WorldFish, together with fisheries ministries and regional partners across Asia and Africa, expanded collaborations on climate-smart aquaculture, disease surveillance, and resilient aquatic food systems.

In Bangladesh, Egypt, and Southeast Asia, programs are supporting improved fish breeding, low-emission feed systems, digital pond monitoring, and disease management for smallholder producers.

According to FAO, aquaculture now supplies over 50% of aquatic animal foods consumed globally, increasing the need for more resilient production systems.

These investments are expected to strengthen farmer incomes, improve nutrition security, and reduce production risks linked to climate variability and aquatic disease outbreaks.

Source

WorldFish; Food and Agriculture Organization (FAO); regional aquaculture resilience programs.

AGRI FACTS

- Agroforestry systems improve biodiversity, carbon sequestration, and farm resilience while creating diversified income streams.
- Heat stress in dairy cattle reduces milk yield, fertility, and feed intake, increasing demand for climate-smart livestock management.
- Aquaculture now supplies more than half of seafood consumed globally, reshaping food systems and nutrition security.

INDIA'S CENTRAL SILK BOARD EXPANDS CLIMATE-SMART SERICULTURE PROGRAMS

Field Focus:

Sericulture is receiving renewed policy and research attention as governments strengthen investments in sustainable silk production and rural livelihoods.

In 2025–26, India's Central Silk Board, together with state governments and research institutions, expanded programs focused on disease-resistant silkworm breeds, improved mulberry cultivation, and climate-resilient silk production systems.

India, the world's second-largest silk producer, supports livelihoods for nearly 9.4 million people, with women playing a significant role across the sericulture value chain.

Recent initiatives are promoting technology-driven cocoon production, farmer training, and silk quality improvement to strengthen productivity and export competitiveness.

These efforts are expected to improve rural incomes, strengthen women-led livelihoods, and enhance resilience in climate-sensitive silk production regions.

Source

Central Silk Board, Government of India; sericulture development reports; FAO rural livelihood studies.

AGRI FACTS

- Digital agriculture platforms are helping farmers access real-time weather intelligence, advisory services, and market prices through mobile technologies.
- Legume crops naturally fix atmospheric nitrogen through microbial symbiosis, reducing fertilizer requirements and improving soil health.
- Growing demand for alternative proteins is reshaping agricultural markets for pulses, algae, and plant-based ingredients.

KENYA, BIOCHAR INITIATIVES AND CLIMATE PARTNERS SCALE SOIL CARBON PROGRAMS

Field Focus:

Biochar is receiving stronger attention as governments and climate-focused organizations invest in soil restoration and carbon-smart agriculture.

In 2025–26, the International Biochar Initiative, climate-finance organizations, and local governments expanded farmer-led biochar programs across Kenya, India, and parts of Southeast Asia to improve degraded soils and climate resilience.

Field programs are promoting biochar for soil fertility improvement, water retention, and nutrient efficiency, particularly in drought-prone regions.

Research suggests biochar can improve crop productivity while contributing to long-term carbon storage, making it increasingly relevant for emerging carbon market discussions.

Several pilot initiatives are also assessing how biochar adoption could support smallholder resilience, lower fertilizer dependency, and climate adaptation outcomes.

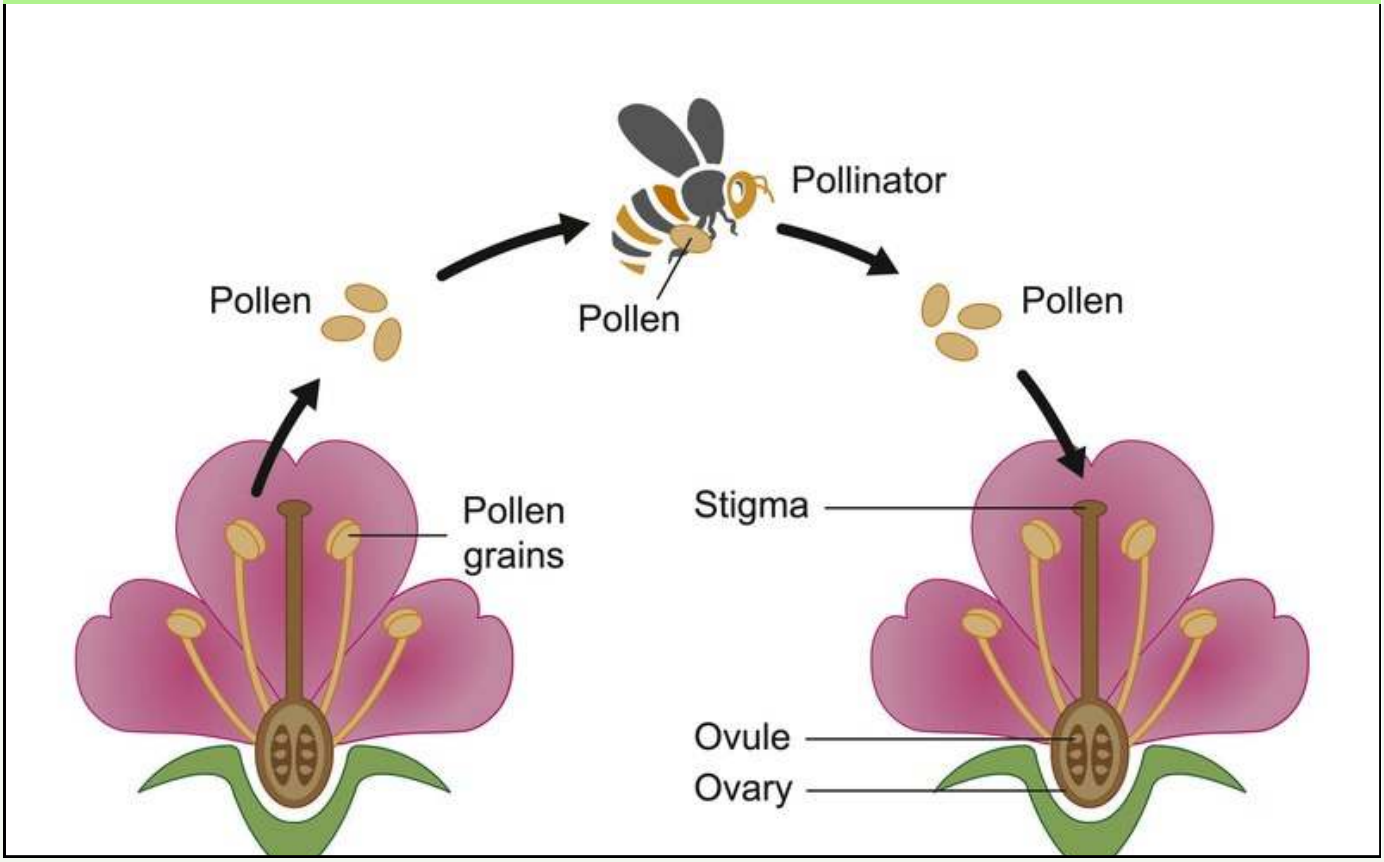
Source

International Biochar Initiative; FAO soil health programs; climate-smart agriculture research institutions.

AGRI FACTS

- Hyperspectral imaging can identify crop stress from nutrient deficiencies, pests, or drought before visible symptoms emerge.
- Regenerative agriculture practices are increasingly linked with improved soil carbon, biodiversity, and water retention capacity.
- Nearly 80% of global farms are smallholder farms, yet they collectively contribute significantly to food production worldwide.

FAO & GOVERNMENTS EXPAND POLLINATOR PROTECTION TO SAFEGUARD FOOD SYSTEMS



Field Focus:

Pollinator protection is receiving stronger global attention as governments and agricultural agencies respond to growing concerns over declining bee populations and food production risks.

In 2025–26, the FAO, biodiversity agencies, and national governments expanded collaborations focused on pollinator-friendly farming, habitat restoration, and honey bee monitoring systems.

Pollinators contribute to nearly 75% of globally important food crops, particularly fruits, vegetables, nuts, and oilseeds.

Several countries are strengthening biodiversity action plans and reducing pollinator risks linked to habitat loss, pesticide exposure, and climate variability.

These initiatives aim to improve crop productivity, strengthen biodiversity conservation, and secure long-term food system resilience.

Source

Food and Agriculture Organization (FAO); biodiversity agencies; pollinator research networks.

AGRI FACTS

- Modern crop breeding increasingly focuses on heat tolerance, drought resilience, and nutrient efficiency, not just yield.
- Post-harvest losses in perishables can exceed 30–40% in some regions, highlighting the importance of cold chains and storage systems.
- Agricultural drones are increasingly used for crop monitoring, precision spraying, and field mapping, reducing labor dependency.

AGFUNDER REPORTS CONTINUED INVESTMENT IN AI & PRECISION AGRICULTURE STARTUPS

Field Focus:

Investment in agritech startups continues to prioritize AI-powered advisory systems, precision agriculture, and farm automation technologies as food systems seek higher efficiency and climate resilience.

According to AgFunder's global agrifood investment reports, digital agriculture remains a priority area despite broader investment slowdowns.

Funding continues to support startups working on yield forecasting, satellite-driven crop intelligence, irrigation optimization, and automated farm monitoring, particularly in climate-vulnerable regions.

Investors are increasingly focusing on technologies that improve resource-use efficiency and farm-level risk management.

Partnerships among startups, agribusinesses, and research institutions are also accelerating adoption of digital tools, helping improve productivity and decision-making in modern farming systems.

Source

AgFunder global agrifood investment reports; agri-tech ecosystem updates.

AGRI FACTS

- Food systems contribute nearly one-third of global greenhouse gas emissions, making agriculture central to climate mitigation solutions.
- Crops exposed to elevated atmospheric CO_2 may show reduced concentrations of iron, zinc, and protein, raising concerns about "hidden hunger."
- Carbon farming markets are increasingly rewarding farmers for practices that improve soil carbon sequestration and ecosystem restoration.

INBAR AND GOVERNMENTS EXPAND BAMBOO-BASED GREEN ECONOMY PROGRAMS

Field Focus:

Bamboo-based development is receiving increased policy support as governments explore sustainable materials, climate resilience, and rural livelihood opportunities.

In 2025–26, the International Bamboo and Rattan Organization (INBAR) expanded collaborations with governments across Asia, Africa, and Latin America to strengthen bamboo-based value chains.

Programs are promoting bamboo for land restoration, sustainable construction materials, biomass, and rural enterprise development.

According to INBAR, bamboo-based systems can contribute to carbon sequestration, degraded land recovery, and green livelihood creation, particularly in climate-vulnerable regions.

These investments are expected to strengthen rural economies while supporting low-carbon development and sustainable natural resource systems.

Source

International Bamboo and Rattan Organization (INBAR); sustainable livelihoods and climate reports.

Agri Facts

- Global fertilizer efficiency remains low in many systems, with crops often utilizing less than half of applied nitrogen, leading to economic and environmental losses.
- Methane-reducing feed additives in livestock are emerging as a strategy to reduce emissions without compromising productivity.
- Women-led farmer groups often demonstrate higher adoption of nutrition-sensitive agriculture practices, improving household food diversity.

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