SOUVENIR

GLOBAL CONFERENCE ON WOMEN IN AGRI-FOOD SYSTEMS

(GCWAS-2026)

DRIVING PROGRESS, ATTAINING NEW HEIGHTS

March 12-14, 2026

Bharat Ratna C. Subramaniam Hall, ICAR Convention Centre,
National Agricultural Science Complex (NASC),
Pusa Campus, New Delhi-110012, India

www.gcwas.taas.in

Organizers and Co-Organizers

Organizers

Indian Council of Agricultural Research (ICAR)

Trust for Advancement of Agricultural Sciences (TAAS)

Consultative Group of International Agricultural Research (CGIAR)

Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA)

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Foreword

IT gives me great pleasure to present this Souvenir of the Global Conference on Women in Agri-Food Systems (GCWAS 2026) held from 12-14 March 2026 under the theme "Driving Progress, Attaining New Heights" The conference convenes an eminent assembly of scientists, development professionals, policymakers, entrepreneurs, and practitioners from across the globe who are committed to strengthening the role of women in transforming agri-food systems and advancing sustainable agricultural development.

The timing of this conference is particularly significant as the global community has just commemorated the International Women's Day on 8 March 2026, which this year calls upon the world to advance gender equality through the themes "Rights. Justice. Action. For All Women and Girls" and the campaign message "Give to Gain" .These themes emphasize that ensuring women's rights, promoting justice, and taking concrete action are essential for building equitable societies, while collective investments in women's empowerment ultimately generate wider social and economic benefits for all.

In the context of agriculture and food systems, these messages carry profound relevance. Women constitute a substantial proportion of the global agricultural workforce and are key contributors to food production, nutrition security, natural resource management, and rural livelihoods. Yet, they continue to face persistent barriers in accessing land, credit, technology, knowledge, markets, and leadership opportunities. Addressing these inequities is essential not only for gender justice but also for enhancing productivity, strengthening resilience to climate change, and ensuring sustainable food systems for future generations.

This Souvenir captures the key insights from GCWAS 2026, featuring diverse perspectives on gender-responsive innovations, women's leadership, inclusive value chains, digital solutions, and climate-resilient agriculture. The narrative underscore that empowering women is fundamental to transforming global agri-food systems.

Sincere gratitude is extended to all the dignitaries whose support, reflected in their messages, was vital to the conduct of GCWAS-2026. I commend the authors and contributors whose work forms the foundation of this publication and thank them for sharing their knowledge and experiences. I also extend my sincere appreciation to the organizers and the editorial team for their dedicated efforts in bringing together this valuable compilation. It is our hope that these pages catalyze the critical conversations and informed actions necessary to reshape our agri-food systems into models of equity and sustainability.

(R. S. Paroda)
Chairman, TAAS
Chief Patron, GCWAS 2026

Preface

WE are pleased to present the Souvenir for the Global Conference on Women in Agri-Food Systems (GCWAS 2026), held 12–14 March 2026 under the theme "Driving Progress, Attaining New Heights." The conference convened an international audience comprising researchers, policymakers, practitioners, industry leaders, and grassroots innovators, to examine women's critical role in building resilient and inclusive agri-food systems.

The objectives of the conference are to (i) examine the current status of women's participation and leadership across agri-food systems; (ii) discuss scientific, socio-economic, institutional, and policy challenges that limit women's access to productive resources, technologies, markets, and decision-making processes; (iii) highlight innovations, successful models, and gender-responsive technologies that strengthen women's entrepreneurship and leadership in agriculture; and (iv) develop strategic recommendations and a collective way forward for advancing gender equality and empowerment within agri-food systems globally.

The conference features multiple thematic technical sessions, keynote and invited lectures, panel discussions, and oral and poster presentations, addressing diverse issues related to gender equality, women's leadership, climate-resilient agriculture, agri-entrepreneurship, inclusive value chains, nutrition-sensitive agriculture, and emerging technologies for empowering women in agriculture. These sessions bring together interdisciplinary perspectives and experiences from different regions of the world.

This Souvenir has the important policy papers and abstracts of plenary, lead and invited papers presented during the conference. The abstracts reflect a wide spectrum of scholarly work and practical experiences aimed at strengthening women's agency, enhancing their access to opportunities within agri-food systems, and promoting inclusive agricultural development. The insights presented here collectively contribute to the evolving discourse on gender-responsive agricultural transformation.

We express our deepest gratitude to Dr. R. S. Paroda, Chairman, Trust for Advancement of Agricultural Sciences (TAAS), New Delhi, and Chief Patron of GCWAS 2026, for his visionary leadership and continued commitment to promoting science-based agricultural development and gender-inclusive progress in the agri-food sector.

We gratefully acknowledge the guidance and encouragement of the Patrons of the Conference — Dr. M. L. Jat, Secretary, DARE and Director General, Indian Council of Agricultural Research (ICAR); Dr. Ismahane Elouafi, Executive Managing Director, CGIAR; and Dr. Trilochan Mohapatra, Chairperson, Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) — whose leadership and global perspective have greatly strengthened the vision and outreach of this conference.

We sincerely appreciate the invaluable counsel provided by the International Advisory Committee, comprising eminent global leaders in agricultural research and development, including Dr. Aly Abousabaa (ICARDA), Dr. Nick Austin (ACIAR), Dr. Bram Govaerts (CIMMYT-BISA), Dr. Himanshu Pathak (ICRISAT), Dr. Prabhu Pingali (Tata-Cornell Institute, Cornell University), Dr Juan Lucas Restrepo (Alliance of Bioversity International and CIAT), and Dr Soumya Swaminathan (M. S. Swaminathan Research Foundation). Their insights and global perspectives have greatly enriched the conceptualization and scientific framework of the conference.

We also acknowledge the strategic direction provided by the Steering Committee, chaired by Dr Renu Swarup, with Dr Rajbir Singh (ICAR) as Co-Chairperson, along with distinguished members representing leading international and national organizations, including the Bill & Melinda Gates Foundation, IFPRI, CGIAR institutions, academic institutions, and development organizations. Their contributions have been instrumental in shaping the program and ensuring its global relevance.

Our sincere appreciation is extended to the Organizing Institutions — the Indian Council of Agricultural Research (ICAR), Trust for Advancement of Agricultural Sciences (TAAS), Consultative Group on International Agricultural Research (CGIAR), and the Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) — for their leadership and institutional support in convening this global forum.

We also gratefully acknowledge the support of the Co-Organizing and Partner Institutions, including CIMMYT, Borlaug Institute for South Asia (BISA), Alliance of Bioversity International and CIAT, ICARDA, CIFOR-ICRAF, ACIAR, IFPRI, IWMI, CGIAR Gender Equality and Inclusion Initiative, S. M. Sehgal Foundation, Tata-Cornell Institute, Bharat Krishak Samaj, and the Indian Society of Plant Genetic Resources (ISPGR) for their valuable partnership in organizing the conference and contributing to its global perspective.

We gratefully acknowledge the Sponsors, Knowledge Partners, and supporting organizations, whose generous financial and technical support has greatly facilitated the successful organization of this international conference.

Our special thanks are due to the Conference Chair, Dr. Renu Swarup, and the Conference Secretariat led by Dr. Rishi K. Tyagi and Dr. Rajarshri Roy Burman; and Co-Convenors, Dr. Anuradha Agrawal, Dr. Mridula Devi, and Dr. Anupama Singh, along with members of the organizing committees and volunteers, whose dedication and meticulous planning ensured the smooth conduct of the conference and the preparation of this Book of Abstracts.

Finally, we extend our heartfelt appreciation to all plenary speakers, keynote and invited speakers, panelists, session chairs, authors, reviewers, exhibitors, and participants from India and abroad. Their scholarly contributions, insightful discussions, and active engagement have enriched the conference and contributed significantly to advancing the dialogue on women's empowerment in agri-food systems.

Organizing Committee

Global Conference on Women in Agri-Food Systems (GCWAS 2026)

Messages

MESSAGE

Droupadi Murmu
President
Republic of India

I am happy to know that the Indian Council of Agricultural Research (ICAR), Trust for Advancement of Agricultural Sciences (TAAS), Consultative Group on International Agricultural Research (CGIAR) and Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) are organising a Global Conference on Women in Agri-Food Systems (GCWAS-2026) on 12th March, 2026. A souvenir is being published to mark the occasion.

Women play a significant role across India and around the world in the agri-food systems. Their contributions range from farming and seed conservation to food processing, marketing and household nutrition. Women are the quiet architects of our agricultural heritage and dynamic drivers of its future. Their knowledge, resilience and leadership contribute significantly to food security, sustainable agriculture and rural development.

I am confident that the discussions and knowledge exchange during this conference will generate valuable insights and provide innovative approaches for empowering women farmers, entrepreneurs and professionals in the agriculture sector.

I extend my warm greetings and felicitations to the organisers and participants. I wish the Conference and publication of souvenir every success.

(Droupadi Murmu)

New Delhi
11 March, 2026

MESSAGE

Narendra Modi
Prime Minister of India

IT is heartening to learn about the Global Conference on Women in Agri-Food Systems-CGWAS 2026. The theme, "Driving Progress, Attaining New Heights", is both timely and inspiring. As the world marks 2026 as the International Year of the Woman Farmer, this conference offers a valuable opportunity to recognise and celebrate the vital role women play in strengthening agri-food systems across the globe.

Across cultures and continents, women have long been at the heart of agriculture. They nurture the soil, preserve traditional knowledge and sustain rural livelihoods. Empowering women farmers is therefore essential for building secure food systems and ensuring sustainable development.

In India, women play a pivotal role across the agri-food value chain, from cultivation and livestock care to food processing and rural entrepreneurship. Our development approach increasingly emphasises women-led development, recognising women not merely as participants but as leaders and innovators in the rural economy.

Women's Self-Help Groups have emerged as powerful engines of transformation. Across rural India, these collectives are enabling women to build grassroots enterprises, particularly in food processing and value addition, helping farmers capture greater value from their produce while generating new livelihoods in villages.

Complementing this is the Lakhpati Didi initiative, which encourages women associated with Self-Help Groups to pursue diversified livelihood opportunities and achieve income growth. So far, over 30 million women have been empowered through this initiative.

At the same time, programmes such as Namo Drone Didi are opening new frontiers by training rural women to operate agricultural drones for precision farming services, reducing drudgery while creating new avenues of income and technological leadership.

In India, women play a central role in the dairy sector, which is one of the most important pillars of the rural economy. Many of the day-to-day activities in dairy farming are carried out by women. Their participation sustains millions of households and strengthens nutritional security for the entire nation. Through dairy cooperatives, many rural women are increasingly engaging in

milk production, collection, value addition and dairy-based enterprises. Their contribution has been a key factor behind India's emergence as one of the world's leading milk producers, demonstrating how women's participation can drive both agricultural growth and rural prosperity.

The discussions at this conference can help deepen global cooperation and knowledge sharing. By investing in women farmers, we invest in stronger food systems, more prosperous rural communities and a healthier planet.

I am confident that the ideas and experiences shared at this conference will inspire new partnerships, innovations and pathways that empower women farmers everywhere.

I extend my best wishes for productive deliberations and successful outcomes at CGWAS-2026.

(Narendra Modi)

New Delhi
फाल्गुन 15, शक संवत् 1947
06 March, 2026

MESSAGE

Shivraj Singh Chouhan
Union Minister of Agriculture & Farmers Welfare
Government of India

IT gives me immense pleasure to know that the *Global Conference on Women in Agri-Food Systems (GCWAS-2026)* is being organized during March 12-14, 2026 at New Delhi, coinciding with the International Year of Woman Farmer.

Women farmers, scientists and agripreneurs form the backbone of India's agri-food systems, contributing significantly across production, value chains, processing and marketing. Strengthening their access to technology, finance, institutions and markets is essential for sustainable agricultural growth and farmers' prosperity.

This Conference provides a unique global platform to showcase success stories, exchange best practices and deliberate on gender-responsive policies, women-friendly technologies, entrepreneurship models and market linkages, with a clear focus on actionable strategies and policy pathways.

I am confident that GCWAS-2026 will meaningfully contribute to strengthening women's leadership and participation in agri-food systems. I extend my best wishes for the success of the Conference.

(Shivraj Singh Chouhan)

MESSAGE

Annpurna Devi
Union Minister of Women & Child Development
Government of India

I am pleased to know that the Global Conference on Women in Agri-Food Systems (GCWAS-2026) is being organized during March 12-14, 2026 in New Delhi, coinciding with the International Year of Woman Farmer.

Women's empowerment in agriculture is closely linked with nutrition security, family well-being and sustainable livelihoods. Strengthening women's access to education, skills, technology, finance and markets is critical for achieving holistic and inclusive development.

The Conference provides an important platform to deliberate on gender-responsive policies, women-centric technologies, entrepreneurship and leadership, while fostering convergence across sectors and institutions. Its focus on actionable outcomes and scalable models is especially relevant for translating empowerment into lasting impact.

I am confident that GCWAS-2026 will contribute meaningfully towards advancing women-led development in agri-food systems.

I wish a great success for the Conference.

16 February, 2026

(Annpurna Devi)

MESSAGE

Bhagirath Chaudhary
Minister of State for Agriculture & Farmers' Welfare
Government of India

WOMEN play a vital role across all dimensions of the agri-food system – from production and livestock management to value addition, processing and marketing. Strengthening their access to technology, institutions, finance and markets is essential for enhancing farm productivity, improving livelihoods and ensuring sustainable agricultural growth. In this context, Global Conference on Women in Agri-Food Systems (GCWAS-2026) is being organized during March 12-14, 2026 at New Delhi.

The Conference provides a valuable platform to bring together stakeholders from across the world to share experiences, showcase successful models and deliberate on gender-responsive policies, women-friendly technologies and market linkages. The focus on actionable outcomes and scalable models will help translate ideas into field-level impact.

I am confident that GCWAS-2026 will contribute meaningfully to strengthening women's participation and leadership in agri-food systems.

I extend my best wishes for the success of the Conference.

(Bhagirath Chaudhary)

संदेश

राम नाथ ठाकुर
राज्य मंत्री, कृषि एवं किसान कल्याण मंत्रालय
भारत सरकार

भारत में कृषि कार्यबल का एक महत्वपूर्ण हिस्सा महिलाएँ हैं, जो कृषि कार्यों, पशुपालन प्रबंधन, बीज संरक्षण तथा ग्रामीण आजीविका में व्यापक योगदान देती हैं। ज्ञान, कौशल, प्रौद्योगिकी एवं बाजार तक पहुँच के माध्यम से महिलाओं का सशक्तिकरण समावेशी एवं सतत कृषि विकास के लिए अत्यंत आवश्यक है। इसी संदर्भ में, कृषि-खाद्य प्रणालियों में महिलाओं पर वैश्विक सम्मेलन (GCWAS-2026) का आयोजन 12-14 मार्च, 2026 के दौरान नई दिल्ली में किया जा रहा है, जो अंतरराष्ट्रीय महिला किसान वर्ष के साथ आयोजित हो रहा है।

इस सम्मेलन का उद्देश्य सफलता की कहानियों को उजागर करना, लैंगिक-संवेदनशील नीतियों को प्रोत्साहित करना तथा कृषि-खाद्य प्रणालियों में महिलाओं की आर्थिक भागीदारी एवं नेतृत्व को सुदृढ़ करने वाले नवोन्मेषी समाधानों की पहचान करना है। साझेदारी, क्षमता निर्माण एवं उद्यमिता पर विशेष बल ग्रामीण महिलाओं के लिए नए अवसरों का सृजन करेगा।

मुझे विश्वास है कि GCWAS-2026 की विचार-विमर्श प्रक्रियाएँ महिला-केंद्रित कृषि विकास हेतु नीतियों एवं कार्यक्रमों को और अधिक सुदृढ़ करने में सहायक सिद्ध होंगी।

मैं सम्मेलन की सफलता हेतु अपनी हार्दिक शुभकामनाएँ प्रेषित करता हूँ।

11 March, 2026

(राम नाथ ठाकुर)

MESSAGE

Prof. Ramesh Chand
Member, NITI Aayog, Government of India
Parliament Steet, New Delhi

WITH much delight, I compliment the Trust for Advancement of Agricultural Sciences (TAAS), Indian Council of Agricultural Research (ICAR), CGIAR, Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA) and the co-organizers for organizing the Global Conference on Women in Agri-Food Systems 2026 during March 12-14, 2026 at New Delhi.

It is befitting that the Conference is being inaugurated by the Hon'ble President of India, reflecting the nation's highest commitment to gender equity and inclusive agricultural growth.

The recognition of 2026 as the International Year of Women Farmers is opportune to recognize and acknowledge the pivotal role of women in agriculture and allied sectors. Women play an active and transformative role across the entire agri-food value chain leading to significant socio-economic advancement of families and communities.

Women farmers are not only cultivators but also custodians of biodiversity; innovators in climate-resilient practices; and drivers of nutrition-sensitive agriculture. Strengthening their access to land, credit, technology, markets, extension services, and decision-making platforms is essential for building sustainable and resilient agri-food systems.

This Conference provides a vital global platform for policymakers, researchers, development partners, farmer organizations, and entrepreneurs to deliberate on evidence-based strategies that enhance women's leadership, productivity, and entrepreneurship in agriculture. The exchange of best practices, research insights, and policy experiences will contribute meaningfully toward achieving food security, nutritional well-being, and sustainable development.

I am confident that the deliberations and recommendations emerging from this Conference will help shape progressive policies and collaborative actions that empower women farmers and strengthen agri-food systems worldwide.

I extend my best wishes for the grand success of the Global Conference on Women in Agri-Food Systems 2026.

(Ramesh Chand)

New Delhi
03 March, 2026

MESSAGE

Dr RS Paroda
Chief Patron, GCWAS - 2026
Chairman, TAAS and Former Secretary, DARE & DG, ICAR

IT gives me immense pleasure to know that the Indian Council of Agricultural Research (ICAR) is bringing out a compendium titled *"Case Studies – Women and Agriculture: Shaping the Future Together"* in the context of the Global Conference on Women in Agri-Food Systems (GCWAS-2026) and the International Year of Woman Farmer (2026) declared by the United Nations.

I am pleased that the Indian Council of Agricultural Research (ICAR), the Trust for Advancement of Agricultural Sciences (TAAS), Consultative Group on International Agricultural Research (CGIAR), and the Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA) are planning to organise the Global Conference on Women in Agri-Food Systems from 12-14 March, 2026. It is very timely as 2026 has been declared by the United Nations (UN) as the International Year of the Woman Farmer. It will bring together policymakers, scientists, leaders, practitioners, entrepreneurs, women farmers, and students from across the world to deliberate on one of the most critical dimensions of sustainable development and food security.

Women are the backbone of agriculture and food systems worldwide—contributing substantially to food production, nutrition, value chains, and household food security—yet their contributions often remain under-recognized and unrewarded. Therefore, fostering an enabling environment for gender-responsive policies, and ensuring equitable access to resources, technology, markets, and both decision making and leadership opportunities are critical to building resilient, inclusive, and climate-smart food systems globally.

I am confident that this Conference will result in actionable outcomes, strengthen global partnerships, and inspire collective commitment towards empowering women as key drivers of socioeconomic transformation in agriculture and allied sectors.

I wish the Conference all the success.

(RS Paroda)

MESSAGE

Dr ML Jat
Secretary, Department of Agricultural Research and Education,
Ministry of Agriculture & Farmers Welfare, Government of India
& Director General, Indian Council of Agricultural Research

FROM smallholder farms in Asia and Africa to advanced agri-enterprises in Europe and the America, women contribute, significantly, across the entire agri-food value chain, thereby spanning crop production, livestock, fisheries, forestry, processing, marketing, nutrition, and household food security. Despite constituting nearly half of the agricultural workforce worldwide, their contributions often remain under-recognized and under-supported, particularly in terms of access to land, technology, finance, markets, and leadership opportunities.

In many developing regions, including India, feminization of agriculture is increasingly evident due to male out-migration and structural transformations. Women today are not only cultivators and labourers, but also innovators, entrepreneurs, knowledge-holders, climate stewards, and custodians of agrobiodiversity. Their role is central to achieving global goals related to food security, nutrition, climate resilience, and sustainable development.

Women across the globe contribute for agri-food systems including production, processing, markets, and consumption, and their empowerment is critical for achieving sustainability, resilience & equity in food systems. In this context, the Global Conference on Women in Agri-Food Systems (GCWAS-2026), being jointly organized by ICAR, TAAS, CGIAR and PPV&FRA during March 12–14, 2026 at the ICAR Convention Centre, New Delhi, assumes global significance.

Building on the legacy of the First Global Conference on Women in Agriculture (2012), GCWAS-2026 represents a decisive shift from dialogue to action, with a focus on implementation, partnerships, policy transformation, and measurable outcomes. The global recognition of 2026 as the International Year of Woman Farmer further provides a historic opportunity to accelerate gender-responsive reforms, mobilize investments, and strengthen international cooperation for empowering women in agriculture.

This Conference will bring together global women leaders, scientists, policymakers, entrepreneurs, farmers, youth and other stakeholders to deliberate on critical themes like women's leadership and decision-making in

agri-food systems, gender-responsive policies and market access, emerging and disruptive technologies for women farmers, women-led enterprises and economic inclusion and climate-resilient and nutrition-sensitive agri-food systems. The Conference will also showcase inspiring global success stories and develop actionable roadmaps, scalable models and policy frameworks for strengthening women's participation and leadership at all level, from grassroots to global platforms.

I am confident that the deliberations and outcomes of GCWAS-2026 will catalyze transformative partnerships and contribute, significantly, towards building inclusive, resilient, gender-equitable and sustainable agri-food systems globally.

I extend my best wishes for the grand success of this important global initiative.

(ML Jat)

20 February, 2026
New Delhi

MESSAGE

Dr Trilochan Mohapatra
Chairperson, Protection of Plant Varieties and
Farmers Rights (PPV&FRA), New Delhi

IT gives me immense pleasure to extend my warm greetings on the occasion of the Global Conference on Women in Agri-Food Systems (GCWAS-2026). The gracious consent of the Hon'ble President of India to inaugurate this important conference underscores the national and global significance of advancing women's leadership in agriculture and food systems. Women constitute nearly half of our population and play indispensable roles across the entire agri-food value chain from research and innovation to farming, processing, entrepreneurship, and policy leadership. Yet, their representation in decision-making positions remains disproportionately low. Achieving the Sustainable Development Goals and realizing our agricultural growth targets will remain incomplete unless women participate fully and equitably at every level.

The GCWAS-2026 is being jointly organized by Trust for Advancement of Agricultural Sciences (TAAS), Indian Council of Agricultural Research (ICAR), the Consultative Group on International Agricultural Research (CGIAR), Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA), and other esteemed partners. The theme of advancing women's leadership and participation in agri-food systems is both timely and transformative. Women are central to agricultural production, biodiversity conservation, seed systems, nutrition security, and rural entrepreneurship. Strengthening their access to resources, technologies, education, and decision-making platforms is essential for building resilient, inclusive, and sustainable food systems worldwide.

I am confident that GCWAS-2026 will serve as a robust platform for dialogue, policy innovation, and collaborative action among researchers, policymakers, development partners, and grassroots leaders. The deliberations and outcome of this conference will undoubtedly contribute to shaping gender-responsive strategies that recognize and reward the invaluable contributions of women farmers and professionals across the agri-food value chain. I extend my best wishes for the grand success of the Conference and commend the Organizing Committee for this highly-relevant global initiative.

25 February, 2026

(Trilochan Mohapatra)

MESSAGE

Imahane Elouafi
Executive Managing Director, Consultative Group for International Agricultural Research (CGIAR)

Dear colleagues,

It is my utmost pleasure to present my greetings to all participants of the Global Conference on Women in Agri-Food Systems 2026. This important gathering comes at a time when food systems are under unprecedented pressure. Women sit at the epicenter of food systems worldwide, yet they continue to experience persistent barriers and unequal access to resources. Addressing these gaps is essential not only for gender equality and social inclusion, but also for achieving food and nutrition security, resilient food systems, and sustainable development for all.

There is also a clear economic imperative to advancing gender parity in the agricultural sector. When women have equal access to land, finance, technology, and markets, agricultural productivity rises, incomes grow, and rural economies become more dynamic and resilient. Closing gender gaps in agriculture is not a social add-on — it is a strategic investment that strengthens value chains, boosts national economies, and accelerates inclusive growth. Simply put, empowering women in agri-food systems is one of the most effective levers we have to drive economic transformation.

At CGIAR, we are committed to advancing gender-transformative science and innovations through partnerships that empower women, men, youth, and marginalized communities as leaders of this transformative movement. Through our Gender Equality and Inclusion Accelerator and collaborations across Africa, Latin America and the Caribbean, and the Asia-Pacific, we are strengthening evidence, building capacity, and developing and scaling innovations that improve livelihoods and unlock the full economic potential of inclusive agri-food systems.

I commend all those involved with GCWAS-2026 for creating this platform in support of our shared vision and mission. Thank you.

Sincerely,

(Imahane Elouafi)

MESSAGE

Dr Renu Swarup
Former Secretary to the Government of India
Department of Biotechnology, Ministry of Science & Technology
New Delhi, India

IT is a pleasure to Welcome all delegates and participants to this "Global Conference on Women in Agri-Food Systems (GCWAS-2026)" being held at New Delhi, India from 12-14 March 2026 .The Conference brings together stakeholders – women leaders, policy makers , scientists, entrepreneurs, farmers, students to collectively discuss measures for strengthening the policy framework and ecosystem for mainstreaming gender participation in Agrifood systems. It is important to develop a Road map for ensuring gender equity and equality to enable Women farmers to have access to new emerging technologies ,land resources , economic inclusion , extension services and increasing women's representation in decision-making positions.

Women in Agriculture like all other areas make significant contributions ,yet are not fully recognised , nor appropriately rewarded .Gender Equality and Gender Equity are terms we have been laying stress on for long now .Globally there is a strong voice raised on these issues ,UN General Assembly has declared 2026 as the International year of women farmers to acknowledge the key role played by Women in agriculture ,food security and nutrition and highlight the challenges and barriers faced. While it is imperative that we continue to discuss these issues and ensure that the spotlight stays on women in Agrifood systems , it is a matter of concern that we have collectively not moved the needle enough on this matter. We need to identify policy and other changes needed to mainstream gender participation for them to be centre staged. Time is now to move from Policy to Action .

The Conference which has participation of nearly 600 delegates from more than 20 countries , is an excellent platform for sharing of experiences and best practice case studies . The Conference will provide an opportunity to have in-depth discussions on issues related to new, emerging and disruptive technologies which bring gender transformational change, mainstreaming gender equality and social inclusion, women empowerment through financial inclusion, building women leadership and policies to provide market access. There are separate sessions planned for Women Farmers and Youth in

Agriculture . We hope that through the deliberations we will be able to bring out recommendations which help develop a clear Strategy and roadmap for institutionalising gender initiatives across global, regional and national programs and developing an enabling Policy framework to implement these

As the Conference Chair , I hope you all have a productive deliberation for three days and wish the Conference great success

(Renu Swarup)

MESSAGE

Dr Bram Govaerts

Director General (Secretary General and Chief Executive Officer),
International Maize and Wheat Improvement Center (CIMMYT),
Mexico City, Mexico

WOMEN are half the sky. Their full inclusion is essential to closing the gender gap and achieving lasting food security.

I extend my best wishes to the Global Conference on Women in Agri-Food Systems (GCWAS) for a productive and impactful convening. By bringing together leaders, policymakers, researchers, and practitioners, this conference can move beyond dialogue toward decisive, evidence-driven action and stronger commitments to gender equality.

From smallholder farms to local markets, women are at the heart of the world's food systems. They make up 43% of the agricultural labour force in developing countries, sustaining livelihoods and nourishing communities. CIMMYT's work across the Global South shows that when women have equitable access to resources, knowledge, and decision-making, food systems become more resilient and economies stronger.

At the conference, I look forward to advancing this understanding and amplifying gender-responsive solutions—from lab to field—in our science, partnerships, and implementation. May this conference inspire bold commitments and sustained action toward a more inclusive and resilient agri-food future.

Bram Govaerts

MESSAGE

Dr Himanshu Pathak
Director General, International Centre Research in
Semi-Arid Tropics (ICRISAT), Patancheru, Telangana, India

AS Director General of International Crops Research Institute for the Semi-Arid Tropics, it is my honour to welcome you to the Global Conference on Women in Agri-food Systems (GCWAS) 2026. This gathering comes at a pivotal time. Women are central to agri-food systems worldwide—as farmers, scientists, entrepreneurs, workers, and leaders—yet their opportunities are shaped by intersecting factors such as age, ethnicity, disability, socio-economic status, geography, and social norms. A Gender Equality and Social Inclusion (GESI) lens compels us to confront the structural barriers that limit not only women, but also youth, indigenous people, persons with disabilities, and other marginalized groups.

At ICRISAT, we have learned that advancing gender equality requires transforming systems—not simply increasing representation. When women and marginalized communities gain secure access to land, climate-resilient technologies, finance, markets, digital tools, knowledge, and leadership opportunities, food security improves, incomes rise, and resilience to climate and economic shocks strengthens.

Applying a GESI lens also reshapes how we conduct science. Gender-responsive and socially inclusive research ensures innovations are accessible, affordable, and relevant to diverse users. It demands intersectional data, co-creation with communities, and success measured not only by productivity, but by agency, voice, and equitable benefit-sharing.

As we advance women's leadership in agri-food systems, let us commit to four priorities:

1. Move from participation to meaningful leadership in governance, policy, research, and markets.
2. Address structural inequalities in policies, institutions, and financing.
3. Invest in youth and intergenerational equity in climate-smart agri-food systems.
4. Strengthen accountability through clear GESI targets, indicators, and learning frameworks.

Transforming agri-food systems requires more than technical solutions—it demands inclusive leadership and systemic change. By placing gender equality and social inclusion at the core of agricultural research and development, we accelerate progress toward food security, climate resilience, and sustainable livelihoods.

Let this conference be a catalyst for action—where evidence informs policy, partnerships scale impact, and inclusion becomes the norm.

On behalf of ICRISAT, I commend your leadership and commitment. Together, let us build agri-food systems that are equitable, resilient, and inclusive for all.

I wish this conference a great success!

(Himanshu Pathak)

MESSAGE

Dr Soumya Swaminathan
Chairperson, M S Swaminathan Research Foundation (MSSRF) &
National Science Chair, ANRF, Chennai, Tamil Nadu, India

I extend my warmest wishes to all participants and organizers of the Global Conference on Women in Agri-Food Systems (GCWAS-2026). It is a timely initiative during the International Year of the Woman Farmer to recognize that women are central to our agri-food systems, from research and innovation to production, processing, markets, and nutrition. Farmers, especially women farmers are indispensable for achieving food security, equity, and climate resilience today.

I am confident that GCWAS-2026 will generate concrete strategies, partnerships, and drive gender-sensitive policies to strengthen women's agency and economic inclusion at every level of the agri-food system. The focus on disruptive and women-friendly technologies, inclusive markets, and next-generation women leadership will help ensure that progress is both scalable and sustainable. I hope this conference will mark a turning point, where empowering women in agri-food systems is seen not only as a matter of justice, but as a catalyst for a more resilient and sustainable future for all.

Soumya Swaminathan

(Soumya Swaminathan)

MESSAGE

Dr Purvi Mehta
Member,
International Advisory Committee, GCWAS 2026

THE International Conference on Women Farmers comes at a defining moment for global agriculture, when food systems must simultaneously address climate stress, nutritional security, and rural livelihoods. Across developing countries, women contribute 40-70% of food production and constitute a substantial share of the agricultural labour force worldwide, making them indispensable to feeding growing populations and sustaining local economies. Globally, women account for over a third of the agricultural workforce and play central roles not only as cultivators but also as custodians of biodiversity, livestock, and household nutrition. Evidence shows that if women had equal access to productive resources such as land, credit, and technology, farm yields could rise by 20–30%, potentially reducing hunger for 100–150 million people—a powerful reminder that gender equity is not only a social imperative but an agricultural and economic strategy.

India mirrors this global reality in profound ways. Nearly 80% of economically active women in India are engaged in agriculture, and women today form a large and growing share of the agricultural workforce, reflecting the ongoing "feminisation" of farming.

As the United Nations marks 2026 as the International Year of the Woman Farmer to elevate precisely these issues, this conference provides a timely platform to translate recognition into reform, investment, and leadership.

I warmly congratulate the organizers for convening this important dialogue and for advancing a global agenda in which empowering women farmers becomes synonymous with achieving sustainable, resilient, and nutrition-secure food systems.

(Purvi Mehta)

MESSAGE

Dr Shakuntala Haraksingh Thilsted
World Food Laureate, WorldFish, Malaysia

IT is indeed an honour to participate in the Global Conference on Women in Agri-Food Systems (GCWAS-2026): Driving Progress, Attaining New Heights, to be held in March 2026, in Delhi, India. This conference is truly a fitting tribute to honour all women engaged in agri-food systems, throughout the world, and also, to celebrate The International Year of the Woman Farmer 2026.

We must make full use of this conference as a powerful platform to highlight the engagement of women in all aspects of food systems and the many opportunities that they can pursue to ensure that food systems are transformed to become fairer, more inclusive and sustainable, for all.

I look particularly forward to meeting and discussing with participants of this conference who are engaged in aquatic food systems, so that we ensure that all aquatic foods are fully incorporated in food systems. This will also give us the opportunity to pay special attention to the very many women who live in coastal areas and around inland waters and who depend on aquatic food systems to secure their livelihoods as well as contribute to the well-being and food and nutrition security of their families and communities.

I wish the Global Conference on Women in Agri-Food Systems (GCWAS-2026): Driving Progress, Attaining New Heights every success.

Shakuntala

(Shakuntala Haraksingh Thilsted)

MESSAGE

Suri Sehgal
Founder, S M Sehgal Foundation

WARM greetings and hearty congratulations to the organizers and participants of the Global Conference on Women in Agri-Food Systems (GCWAS-2026) during this International Year of the Women Farmer, as declared by the United Nations.

This gathering is a valuable reminder that women are at the forefront of agriculture and the key custodians of food security, nutrition, and community resilience. Empowering women continues to be an essential strategic pathway to sustainable global development.

The empowerment of women is a vital imperative woven into all our core programs at S M Sehgal Foundation to further promote water security, food security, local participation and sustainability. By providing supportive learning environments in government schools that include digital literacy trainings, girls and young women have access to the most advanced technologies in agriculture. We have seen firsthand that when women have the knowledge and agency to use their voices, entire communities move forward with greater hope and strength.

We are delighted that GCWAS-2026 brings together participants from different countries, and may this diverse gathering of hearts and minds advance the dignity, opportunities, and leadership of women across all agri-food systems. I offer my best wishes for meaningful dialogue, new collaborations, and actionable solutions that will continue to uplift the lives of women and go on to ignite positive change to families, communities, and nations.

Very sincerely,

(Suri Sehgal)

MESSAGE

Nick Austin

Acting Chief Executive Officer,
Australian Centre for International Agricultural Research (ACIAR),
Sydney, Australia

Dear Delegates

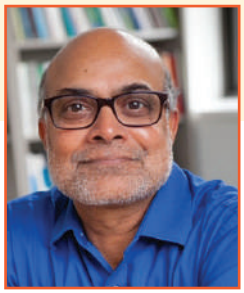
I am pleased to extend my warm greetings to all participants of the Global Conference on Women in Agri-Food Systems 2026. This timely conference brings together leaders, researchers, policymakers and practitioners at a moment when agri-food systems globally are facing growing pressures from climate change, food insecurity and inequality. I commend the organisers for creating an important platform for dialogue, learning and collective action.

Women play central roles across agri-food systems, as producers, entrepreneurs, researchers and custodians of natural resources—yet they continue to face systemic barriers to resources, decision-making and opportunities. At the Australian Centre for International Agricultural Research (ACIAR), we are committed to advancing inclusive, evidence-based agricultural research that improves livelihoods, strengthens food and nutrition security, and supports sustainable and resilient agri-food systems. The aims of this conference—to elevate women's leadership, strengthen collaboration and translate research into practical, scalable solutions, strongly align with ACIAR's work across our partner countries in the Indo-Pacific and Africa.

Through long-term partnerships, capacity development and gender-responsive research, ACIAR seeks to ensure that women and men benefit equitably from agricultural innovation, and that women's knowledge and leadership are embedded in efforts to transform food systems. I am confident that the discussions, insights and partnerships forged during this conference will contribute meaningfully to more inclusive, productive and resilient agri-food systems globally. I wish you every success for a productive and inspiring conference.

Sincerely

(Nick Austin)



MESSAGE

Tata-Cornell Institute
https://tci.cornell.edu/about/

Prof. Prabhu Pingali
Professor and Director,
Tata-Cornell Institute for Agriculture and Nutrition (TCI), USA

MY best wishes to the organizers and participants of Global Conference of Women in Agri-Food Systems (GCWAS). This is a very timely and potentially high impact conference. With 43% of women employed in the agricultural sector, empowering women to fully participate in rural development is not only the right thing to do, but the sensible thing to do. From seed to plate, women are an integral part of transforming food systems across the world. It is my honour to support and participate in the 2026 GCWAS, held during the International Year of Woman Farmer. I trust that it will be remembered for its positive contributions toward empowering women to fully participate in agricultural economies, implementing gender-sensitive policies for agricultural development, nurturing female leadership, and ensuring equitable access to technology.

I hope you have a productive time at the conference and enjoy Delhi.

Prof. Prabhu Pingali

MESSAGE

Dr Rajbir Singh
Deputy Director General (Agricultural Extension), ICAR,
New Delhi, India

IT is a matter of great satisfaction to know that the Global Conference on Women in Agri-Food Systems (GCWAS-2026) is being organized during March 12-14, 2026 at New Delhi, in the backdrop of 2026 being observed as the International Year of Woman Farmer.

Agricultural extension systems play a pivotal role in bridging science with society, and women farmers are central to this transformation. Across India and the world, women contribute significantly to crop production, livestock management, natural resource management, value addition, and household nutrition. However, their access to extension services, technologies, inputs, markets, and institutional platforms often remains limited.

In recent years, ICAR and its network of Krishi Vigyan Kendras (KVKs) and extension institutions have taken concerted steps to promote gender-responsive extension approaches, including women-centric training programmes, drudgery-reducing tools, skill development, entrepreneurship promotion, and support for women-led Farmer Producer Organizations (FPOs) and Self-Help Groups (SHGs).

The Global Conference provides a unique opportunity to share field-level experiences, best practices, and innovative extension models, while strengthening partnerships among research, extension, private sector, civil society and farmer institutions. The emphasis on capacity building, digital extension, climate-resilient technologies, entrepreneurship and market linkages will help translate knowledge into actionable outcomes at scale.

I am confident that GCWAS-2026 will contribute significantly to strengthening gender-transformative extension systems, empowering women farmers as leaders, innovators and agri-entrepreneurs, and advancing inclusive and sustainable agri-food systems.

I extend my best wishes for the success of the Conference.

Yours Sincerely,

(Rajbir Singh)

MESSAGE

Dr Ch. Srinivasa Rao
Director, ICAR-Indian Agricultural Research Institute (IARI),
New Delhi, India

IT is a matter of great pleasure that the Global Conference on Women in Agri-Food Systems (GCWAS-2026): Driving Progress, Attaining New Heights is being organized from 12-14 March 2026 in New Delhi.

Women constitute nearly half of our population and play a central role in agricultural research, innovation, farming, entrepreneurship, and value chains. Yet, their representation in leadership and decision-making remains limited. Achieving the Sustainable Development Goals requires equal participation, equal opportunity, and an equal voice for women across all spheres-particularly in agriculture.

The declaration of 2026 as the International Year of Woman Farmer by the United Nations presents a historic opportunity to accelerate policy reforms, strengthen partnerships, and build a shared agenda for gender-transformative change in agri-food systems. It also underscores the urgent need to recognize, value, and invest in women's contributions across the entire agri-food continuum-from seed to market and from science to society.

GCWAS-2026 will serve as a dynamic platform to showcase inspiring success stories, promote best practices, encourage mentorship and networking, and foster meaningful collaboration among researchers, policymakers, women leaders and farmers as well as industries, start-ups, and youth. The deliberations are expected to generate actionable recommendations that can shape inclusive policies and scalable models for women's empowerment.

At the ICAR-IARI, we remain firmly committed to nurturing an inclusive and enabling ecosystem that empowers women as leaders, innovators, and change-makers in agriculture.

I extend my warm welcome to all participants and wish the conference every success.

(Ch. Srinivasa Rao)

CONTENTS

About

About GCWAS 2026 - Women in Agri-Food Systems

As the world observes the International Year of Woman Farmer in 2026, it is fitting that the agricultural community across the world converges in New Delhi for the *Global Conference on Women in Agri-Food Systems (GCWAS-2026),* during March 12-14, 2026. Set in the green Pusa Campus at the ICAR Convention Centre, this conference is not just another event on the calendar. It is a crucial platform designed to transform years of discussion into tangible action on the ground.

Women are the backbone of agriculture, contributing across the entire agri-food system—from production and post-harvest handling to processing and marketing. Yet, their contributions often remain invisible, and their representation in leadership and decision-making roles is disproportionately low. GCWAS-2026 aims to change this narrative. Building on the legacy of a similar conference held in 2012, this three-day global gathering will focus on one central theme: Driving Progress, Attaining New Heights.

Background and Rationale

The representation of women and gender parity in all spheres is critical for overall growth and success for meeting the Sustainable Development Goals (SDGs). Unless there is equal representation, we will not be able to achieve our desired goals. Women, who constitute nearly 50 per cent of the population and are engaged in all fields, must have equal representation in leadership and decision making.

Women in agriculture are of special importance. To meet our agricultural growth targets, the full participation of women is essential. Women are active in every aspect of agricultural development, from research to industry and farming, contributing to increased productivity and production. However, their numbers are often small, especially in decision-making roles, leading to a clear absence of gender balance. To meet our agricultural growth targets, therefore, full participation of women cannot be overlooked.

It is unequivocally agreed that women's empowerment is key to strengthening their participation in decision-making, which is crucial for socio-economic development. Research has shown that empowering women accelerates a country's economic growth. While we focus on empowering women in leadership, we cannot lose sight of their important role at the grassroots level. To build effective women leaders, implement gender-sensitive policies, and achieve progressive outcomes, we must nurture women leaders and empower women at the grassroots level, both technologically and socially for promoting diverse agri-food systems.

For many years, we have discussed gender diversity and agreed on the need for more women in leadership and decision-making roles. We have also agreed on the need for empowerment to facilitate this process. What we now need is to collectively deliver on the ground. The Global Conference on Women in Agriculture organized in 2012, brought together a large number of women who shared their success stories and examples of their major role in agricultural development through new technologies, research, extension services, and industry activities. There is need for a greater focus now on sharing

experiences and success stories of women leaders, entrepreneurs and farmers for promoting diverse agri-food systems and developing enabling policies to make it happen.

Women contribute across the agri-food system, ranging from production (crops, livestock, forestry, aquaculture, fisheries) to post-harvest handling, transport, processing, consumption, and disposal. Understanding these systems is vital to tackling global challenges of food security, sustainability, and economic growth, especially in low- and middle income countries. Since all parts are interconnected, changes in one area impact the whole system. Agrifood systems must be sustainable, ensuring food security while reducing environmental impact, promoting equity, and remaining resilient to shocks such as climate change, disease, or economic crises. Moving toward circular systems that minimize waste and repurpose byproducts is equally essential.

The recognition of 2026 as the International Year of Woman Farmer serves as a global milestone that can spark policy reforms, public awareness campaigns, and international collaboration, while also providing an opportunity to mobilize resources, forge partnerships, and create a shared agenda for advancing women's role in agriculture. Access to modern agricultural technologies, training programs, and digital tools can further improve women's efficiency, increase their incomes, and strengthen their decision-making power, with digital platforms offering ways to amplify their voices and link them to broader markets.

Building on the successes of the 2012 Global Conference, a renewed platform in New Delhi can focus on moving from discussions to action-oriented implementation, serving as a space to showcase success stories, exchange best practices, and launch progressive policy frameworks. At the grassroots level, targeted training and mentorship programs for rural women can nurture a pipeline of skilled women and future leaders, with women-led cooperatives, Farmer Producer Organizations (FPOs) and self-help groups (SHGs) strengthening collective bargaining power and ensuring that progress reaches even the most marginalized communities. Meaningful collaboration between key stakeholders can help build sustainable support networks, while public–private partnerships can accelerate transformation through combined technical expertise and funding. Empowering women isn't just about ensuring equity, but making them a catalyst of change for food security, economic growth, and climate resilience. The year 2026 must mark the year when we move from rhetoric to real results. The Global Conference will provide an opportunity to have in-depth discussions on all these aspects and will pave the way for developing a clear road map for concrete actions supported with enabling policies.

GCWAS-2026 at a Glance

The conference will be formally inaugurated by the Hon'ble President of India, Smt. Droupadi Murmu on March 12, 2026. The inaugural session will feature the Hon'ble Union Minister for Agriculture & Farmers Welfare and Ministry of Rural Development, Sh. Shivraj Singh Chouhan, as the Guest of Honour. The Valedictory Session on March 14, 2026 will be graced by the Hon'ble Union Minister for Women and Child Development, Smt. Annapurna Devi, as the Chief Guest.

Organized jointly by the Trust for Advancement of Agricultural Sciences (TAAS), Indian Council of Agricultural Research (ICAR), Consultative Group on International Agricultural Research, (CGIAR), and the Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA), the conference will bring together over 700 participants from 18 countries. This diverse group includes women farmers,

GCWAS 2026 - Objectives

- To bring together stakeholders – women leaders, scientists, entrepreneurs, farmers, students to share experiences and case studies.
- To showcase inspiring success stories of women's empowerment and leadership in agriculture to provide replicable and scalable models.
- To identify and promote national and global best practices for nurturing women's leadership and fostering mentorship and networking for the next generation of women leaders.
- To discuss measures for strengthening the policy framework and ecosystem for mainstreaming gender and empowering women technologically and economically.
- Identify emerging and disruptive technologies for gender transformative change.

Technical Sessions

Session 1: Interface with Global Women Trailblazers

- **Focus:** Highlighting leadership lessons from global women leaders.
- **Description:** Candid conversation with renowned international women leaders who achieved significant success.

Session 2: Driving Progress, Attaining New Heights

- **Focus:** Successful case studies by women leaders.
- **Description:** Hear from accomplished women scientists, farmers, and industry professionals as they share their inspiring journeys and showcase how they achieved success and broke barriers in the agri-food sector.

Session 3: Mainstreaming Gender Equality and Social Inclusion

- **Focus:** Integrating gender-sensitive approaches in agri-food systems, gender equity in agri-food policies and institutions.
- **Description:** This session will explore strategies and best practices for effectively incorporating gender equality and social inclusion into agricultural policies, programs, and institutions to create a more equitable system for all.

Session 4: Emerging and Disruptive Technologies for Gender-Transformative Change

- **Focus:** Scope for mainstreaming gender-sensitive agricultural technologies, women-friendly tools for drudgery reduction to digital inclusion (ICT, AI, IoT, and climate-smart technologies tailored to women farmers).
- **Description:** This sub-theme will highlight the importance of developing and implementing technologies and practices that specifically address women's needs, enhancing their productivity, efficiency, and empowerment.

Session 5: Building Future Leadership in the Agri-Food Sector

- **Focus:** Nurturing the next generation of leaders.
- **Description:** Discussions will focus on building mentorship platforms, creating opportunities for young women in agriculture, and equipping them with the skills and knowledge needed to become the future leaders of the agri-food sector.

Session 6: Empowering Women through Economic Inclusion

- **Focus:** Entrepreneurship, Employment, and Financial Models for market linkages, cooperatives, e-commerce and microfinance innovations.
- **Description:** This session will delve into the critical role of economic empowerment, exploring successful models of women's entrepreneurship, access to finance, and employment opportunities that strengthen their position in the agri-food value chain.

Session 7: Gender Dynamics in Policy and Market Access

- **Focus:** Policy Influence on food security and market opportunities.
- **Description:** Experts will analyze how gender-responsive policies can improve food security and ensure that women farmers and entrepreneurs have equal access to markets, resources, and decision-making processes.

Session 8: Women Farmers' Forum: From Field Challenges to Global Influence

- **Focus:** Bridging farm challenges with policy frameworks to amplify the economic and social influence
- **Description:** Sharing best practices, ground realities and actionable strategies to ensure women farmers secure fair market access, technology and policy support.

Session 9: Youth Forum – Nurturing Next Generation of Agri-Food Leaders

- **Focus:** Empowering young professionals and students with skills and vision
- **Description:** Networking, skill development, collaboration, connecting aspiring minds.

Session 10: Way Forward and Valedictory Session

- Summing up and outlining key recommendations.

researchers, policymakers, entrepreneurs, students, and representatives from international and national organizations.

The GCWAS-2026 benefits from the collective wisdom and guidance of an eminent group of patrons and organizers. At the helm is Chief Patron Dr Raj S. Paroda, Chairman of TAAS, whose decades of service to agricultural research provide a strong foundation for this initiative. He is joined by an illustrious team of Patrons including Dr M.L. Jat (Secretary, DARE and Director General, ICAR), Dr T. Mohapatra (Chairperson, PPV&FRA), and Dr Ismahane Elouafi (Executive Managing Director, CGIAR). Dr Renu Swarup, Former Secretary, Department of Biotechnology, Government of India, brings her vast experience in fostering innovation and entrepreneurship as the Conference Chair. She is ably supported by Co-Chair Dr Rajbir Singh, Deputy Director General (Agricultural Extension), ICAR. Together, this leadership team have meticulously curated the event focused on delivering meaningful outcomes. GCWAS-2026 has an extraordinary lineup of speakers and renowned experts from across the globe, who are shaping the global discourse on agriculture, gender, and food systems. They will share their insights, research findings, and experiences, creating a rich tapestry of knowledge and inspiration for all attendees.

Format of the Conference

The GCWAS-2026 is designed to be interactive and inclusive. There are nine technical sessions that feature a mix of formats to ensure every voice can be heard. These include Keynote & Invited Lectures (by eminent scientists, policymakers, and industry leaders), Panel Discussions (in-depth conversations on critical thematic issues), Rapid Oral & Poster Presentations (giving researchers and students a platform to showcase their work).

Besides this, a Youth Forum and Farmers Forum has been integrated to provide wide participation. An Exhibition will be a vibrant knowledge and innovation hub, showcasing women-led initiatives and entrepreneurship across the entire agricultural value chain, highlighting women-led innovations, gender responsive agricultural practices, digital and mechanized solutions, traditional knowledge, and successful models of collectives, startups, and institutions that strengthen livelihoods and nutritional security. The major thematic areas are provided in the table below.

The core objective is simple yet profound: to move from rhetoric to real results. We have spent years discussing gender diversity and the need for empowerment. GCWAS-2026 is designed to be the launchpad for a clear, actionable roadmap. The conference will achieve this by:

» Showcasing Success: Inspiring stories of women leaders, entrepreneurs, and farmers will be shared to provide models that can be replicated and scaled.

- Sharing Best Practices: Global and national experts will identify and promote the most effective ways to nurture women's leadership and create strong mentorship networks.
- Strengthening Policies: Discussions will focus on creating an enabling policy ecosystem that mainstreams gender and empowers women technologically and economically.
- Harnessing Technology: The conference will identify emerging and disruptive technologies that can drive gender-transformative change, from digital tools to climate-smart innovations.

What Will the Conference Deliver?

As we gather in New Delhi in March 2026, the goal is clear: to create a world where women in agri-food systems are not just workers, but leaders; not just participants, but decision-makers. The International Year of Women Farmers provides a powerful backdrop, but the work we do and the commitments we make at GCWAS-2026 will determine whether this year becomes a true turning point. The success of GCWAS-2026 will be measured by its concrete outputs:

- Comprehensive report on success stories across research, industry, farming, and education.
- Roadmap to strengthen women's participation and leadership, empower women for economic inclusion, and mainstream gender in policy, market access, and new technology development.
- Identification and dissemination of global and national best practices for women's inclusive participation and empowerment.
- Compendium of new technologies that have technologically and financially empowered women in the agri-food sector.
- Strategy and roadmap for institutionalizing gender initiatives across global, regional, and national programs.

The journey from dialogue to delivery begins now. Let us work together to drive progress and attain new heights for women in agri-food systems.

Indian Council of Agricultural Research (ICAR)

The Indian Council of Agricultural Research (ICAR) stands as the nation's premier institution for coordinating, guiding, and managing agricultural research and education across India. Established on July 16, 1929, as the Imperial Council of Agricultural Research following the recommendations of the Royal Commission on Agriculture, this august organization began its journey as a registered society under the Societies Registration Act, 1860. Today, it operates as an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India, with its headquarters located at Krishi Bhavan, New Delhi.

Organizational Structure and Governance

The ICAR functions under a well-defined administrative framework that ensures effective policy implementation and research coordination. The Union Minister of Agriculture serves as the ex-officio President of the ICAR Society, which stands as the supreme authority of the organization. The Director-General, who also holds the position of Secretary to the Government of India in the Department of Agricultural Research and Education, serves as the Principal Executive Officer.

The Governing Body, headed by the Director-General, functions as the chief executive and decision-making authority. It comprises eminent agricultural scientists, educationists, legislators, and farmer representatives. This body is assisted by several specialized committees including the Standing Finance Committee, National Agricultural Education Accreditation Board, Regional Committee, and various Scientific Panels.

The scientific mandate of ICAR is executed through eight Deputy Directors-General, each responsible for distinct domains including Crop Sciences, Horticulture, Natural Resource Management, Agricultural Engineering, Animal Sciences, Fisheries, Agricultural Education, and Agricultural Extension.

Mandate and Core Functions

The mandate of ICAR encompasses a comprehensive vision for agricultural development in India. It undertakes to plan, coordinate, and promote research and education in agriculture, agroforestry, animal husbandry, fisheries, home science, and

allied sciences. The Council acts as a clearing house for research and general information relating to agriculture through publications and information systems, while instituting and promoting technology transfer programs.

ICAR provides consultancy services in education, research, training, and information dissemination. It addresses broader rural development concerns by developing cooperative programs with organizations such as the Indian Council of Social Science Research, Council of Scientific and Industrial Research, and various universities. The organization undertakes all activities necessary for attaining its objectives and supporting national agricultural policy formulation.

ICAR's Monumental Contribution to Research, Education and Extension

The story of ICAR is inseparable from India's journey from being a food-deficient nation to achieving food surplus status. When India gained independence, our agriculture system was underdeveloped, and the nation faced the haunting memory of the Bengal Famine of 1943, where an estimated four to five million people perished due to hunger. ICAR's relentless efforts have transformed this narrative dramatically.

From 1950-51 to 2021-22, ICAR's research and technology development enabled phenomenal growth in agricultural production. Foodgrains production increased by 6.21 times, horticultural crops by 11.53 times, fish production by 21.61 times, milk production by 13.01 times, and egg production by an astounding 70.74 times. In 2024–25, India achieved its highest-ever foodgrain output at 353.95 million tonnes, becoming the largest global producer of rice and milk, and ranking second in wheat, horticulture, and fish production.

ICAR oversees one of the largest national agricultural education systems globally, comprising 114 research institutes and 80 agricultural universities spread across the country. This vast network ensures comprehensive coverage of India's diverse agro-ecological and production systems. Its curriculum now incorporates cutting-edge technologies including GPS, drones, remote sensing, data analytics, robotics, and artificial intelligence, preparing students for the agricultural challenges of tomorrow.

ICAR's commitment to translating research into field-level impact is exemplified through its extensive extension network. Over 18.57 lakh farmers have been trained through various programmes, and 4.19 crore mobile-based advisories have been issued to farmers. The Council contributed to 80 percent reduction in stubble burning through awareness campaigns and technological interventions. The network of Krishi Vigyan Kendras provides district-level front-line demonstrations and training, ensuring that scientific advancements reach the grassroots.

ICAR has launched several transformative programs to address contemporary agricultural challenges. The One Scientist One Product initiative focuses on focused research on specific commodities. The 100 Days 100 Varieties campaign enables rapid deployment of improved crop varieties. The Viksit Krishi Sankalp Abhiyan reached 1.35 crore farmers with extension services. The Global Centre of Excellence on Millets promotes nutri-cereals for food and nutritional security. The Second National Gene Bank has been planned to conserve plant genetic resources for future generations. The MAHARISHI Initiative focuses on Millets and Ancient Grains promotion, while the Genome Editing in 40 Crops program represents the next frontier in crop improvement.

Looking Ahead: The Road to 100 Years

As ICAR approaches its centenary year in 2029, the organization stands at an exciting crossroads. The challenges ahead include climate change adaptation, sustaining productivity gains, attracting youth to agriculture, and leveraging digital technologies for precision farming. With its rich legacy of innovation and unwavering commitment to farmer welfare, ICAR is uniquely positioned to lead India's Next Green Revolution – one that is not only productive but also climate-resilient, profitable, and inclusive.

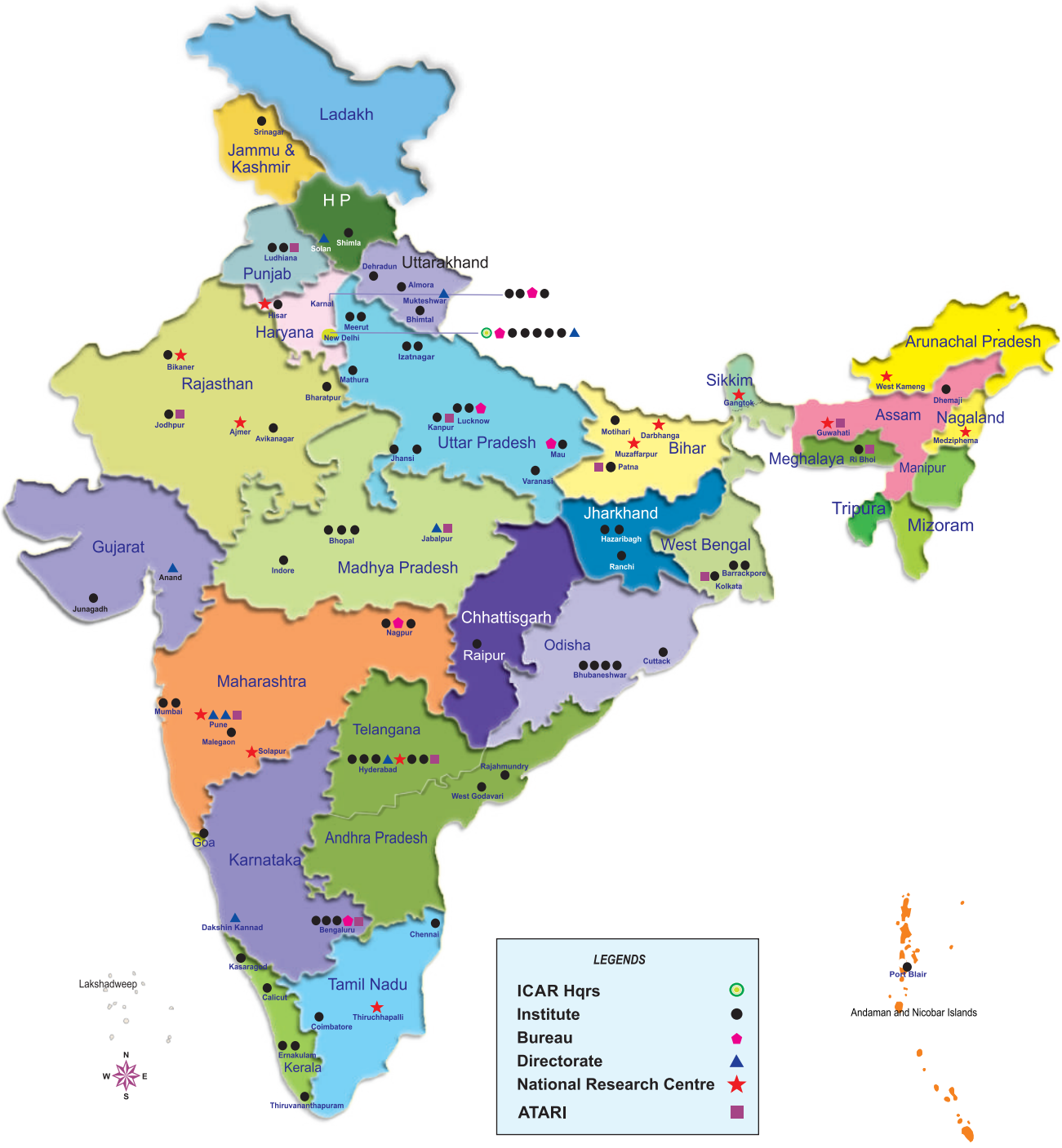
The Union Minister of Agriculture serves as the President of ICAR, ensuring that the organization's priorities remain aligned with national agricultural development goals. Through its vast network of institutions, dedicated scientists, and collaborative partnerships with global bodies like CGIAR, FAO, and international research centers, ICAR continues to fulfill its founding vision: harnessing science for agricultural prosperity.

As the co-organizer of the Global Conference on Women in Agri-Food Systems (GCWAS-2026), ICAR reaffirms its commitment to gender equity in agriculture. With 45 percent of students in its

agricultural universities being women, and through dedicated institutions like ICAR-Central Institute for Women in Agriculture, ICAR has been at the forefront of empowering women farmers, researchers, and entrepreneurs. In a transformative move, ICAR for the first time introduced comprehensive "Gender".

Policy in 2025, which promotes equity and integration of gender perspectives across research and extension, enhancing participation, leadership diversity, and relevance for women farmers. The GCWAS-2026 provides a global platform to showcase these efforts and forge new partnerships for gender-transformative change in agri-food systems.

For more information about ICAR, please visit: *www.icar.org.in*



• 77 Research Institutes • 6 Bureaux • 8 Directorates • 12 National Research Centres • 11 ATARIs

*Map not to scale

Trust for Advancement of Agricultural Sciences (TAAS)

Genesis

The Trust for Advancement of Agricultural Sciences (TAAS) was conceived during the 88th Session of Indian Science Congress (ISC) held at the Indian Agricultural Research Institute (IARI), New Delhi on 3-6 January 2001. The session was presided by Dr RS Paroda, being its General President. Inspired by the inaugural speech of the then Prime Minister, Shri Atal Bihari Vajpayee, who emphasized that India's success depends on how we "take science to the people and create a stronger scientific temper," the National Organizing Committee of ISC established TAAS as a neutral Think Tank. The Trust was formally established on 17 October 2002 with its Headquarters at the Indian Agricultural Research Institute (IARI), New Delhi. TAAS acts as a neutral and vibrant Think Tank for strengthening agricultural research and innovation for development (ARI4D) and catalyzing policy makers, research leaders and farmers for needed reorientation and strengthening of systems for faster scaling-up of innovations and growth of national agriculture.

Vision, Goal, and Mission

- **Vision:** India becomes a prosperous nation through harnessing agricultural sciences while addressing concerns of poverty, hunger and malnutrition.
- **Goal:** Harnessing the potential of agricultural sciences for the welfare of people of India.
- **Mission:** Promoting growth through science-based policy advocacy, public awareness and effective research and development partnerships.

Strategic Thrusts and Activities

TAAS focuses on policy advocacy, technology transfer, information dissemination/knowledge sharing, strengthening partnerships and capacity building. Key activities include:

- Organizing stakeholder dialogues and brainstorming sessions on important thematic and new emerging issues.
- Conferring national awards on scientists and farmers for their outstanding life time contributions.
- Publishing proceedings, strategy papers, success stories, and status reports.

Membership

The Trust draws strength from a diverse membership base. Currently, TAAS has 20 Corporate Members, 27 Institutional Members, 5 Reciprocal Members and 165 Life Members.

Awards

TAAS recognizes excellence through three primary honors, each carrying a cash prize of INR one lakh, a citation and a plaque:

1. **Dr MS Swaminathan Award for Leadership in Agriculture:** Instituted in 2004 in honor of the father of Green Revolution, to recognize those who have made a global impact in the field of agriculture, especially towards food, nutrition and environmental security. To date, 16 eminent experts have been conferred this award.
2. **Dr SK Vasal Award for Excellence in Crop Hybrid Research:** Instituted in 2024 to honor the world-renowned maize breeder and recipient of World Food Prize. So far, three scientists have been conferred with this award.

3. **Dr Norman E Borlaug Innovative Farmer Award:** Instituted through voluntary contributions made by the members of TAAS to honor the world-renowned wheat breeder and a true friend of farmers.

Significant Achievements

» **Policy and Crop Missions:** TAAS had been instrumental in getting maize included in the National Food Security Mission (NFSM), ensuring accelerated maize production from 20 million tonnes in 2010 to now 45 million tonnes. It has also created greater awareness of soybean as a food crop and promoted the use of soya milk and tofu to address protein malnutrient.

» **Genetic Resources Management:** The National Advisory Board has been constituted for the coordination and convergence of all genetic resources Bureaux. Furthermore, the TAAS-recommended "Ranchi Declaration" led to a national plan for the conservation of indigenous breeds and the establishment of the "National Mission on Livestock".

» **Biotechnology and Genome Editing:** TAAS was the first to recommend the Biotechnology Regulatory Authority of India (BRAI) for single-window clearance of GM crops. Based on its initiatives, the Government also approved the use of genome editing in crop improvement and the development of genome edited crop hybrids/varieties under SDN1 and SDN2 out of regulatory process of testing like GM crops.

» **Resource Management:** Through expert dialogues, stakeholders were sensitized to diversification in a "farming systems" mode, soil-test-based fertilizer use, micro-irrigation systems, and the promotion of IPM through use of biopesticides.

» **Youth and Innovation:** To address the challenge of Motivating and Attracting Youth in Agriculture (MAYA), TAAS catalyzed the National Agricultural Research System (NARS) to initiate a program on Attracting and Retaining Youth in Agriculture (ARYA).

» **Sustainability and PPP Models:** TAAS has promoted regenerative agriculture (RA) and climate-smart agriculture. To strengthen public-private partnerships (PPP), an Agriculture Innovation Fund has been created by the ICAR to validate new technologies and link farmers directly to markets.

» **National Missions:** Based on TAAS recommendations, the government initiated the National Mission on Seeds (emphasizing on hybrid seeds).

» **Global Recognition:** The UN Food Systems Summit had recognized TAAS as a vibrant neutral Policy Advocacy 'Think Tank', suggesting that other developing nations may also establish similar platforms for policy advocacy and public awareness.

» **Knowledge Sharing:** Published conference proceedings, strategy papers, and success stories continue to drive widespread attention toward scaling of innovations for sustainable agriculture.

The Protection of Plant Varieties and Farmers' Rights, Act, 2001 - *Sui generis* system to grant intellectual property Rights to the breeders and farmers' for plant varieties.

Introduction

In order to provide for the establishment of an effective system for the protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants it has been considered necessary to recognize and to protect the rights of the farmers in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties. The Govt. of India enacted "The Protection of Plant Varieties and Farmers' Rights Act, 2001" adopting *sui generis* system. Indian legislation is not only in conformity with International Union for the Protection of New Varieties of Plants (UPOV), 1978, but also have sufficient provisions to protect the interests of public sector breeding institutions and the farmers. The legislation recognize the contributions of both commercial plant breeders and farmers in plant breeding activity. To implement the provisions of the Act, the Government of India established the Protection of Plant Varieties and Farmers' Rights Authority on 11th November, 2005.

Objectives of the PPV & FR Act, 2001

1. To establish an effective system for the protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants.
2. To recognize and protect the rights of farmers in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.
3. To accelerate agricultural development in the country, protect plant breeders' rights; stimulate investment for research and development both in public & private sector for the development of new plant varieties.
4. Facilitate the growth of seed industry in the country which will ensure the availability of high quality seeds and planting material to the farmers.

General Functions of the Authority

1. Registration of new plant varieties, essentially derived varieties (EDV), extant varieties;
2. Developing DUS (Distinctiveness, Uniformity and Stability) test guidelines for new plant species;
3. Characterization, documentation of varieties registered;
4. Cataloging facilities of all variety of plants;
5. Documentation, indexing and cataloguing of farmers' varieties;
6. Recognizing and rewarding farmers, farming community, particularly tribal and rural community engaged in conservation, improvement and preservation of plant genetic resources its economic plants and their wild relatives;
7. Maintenance of the National Register of Plant Varieties; and
8. Maintenance of National Gene Bank.

Rights provided under the Act

Breeders' Rights

Breeders will have exclusive rights to produce, sell, market, distribute, import or export the protected variety. Breeder can appoint agent/ licensee and may exercise for civil remedy in case of infringement of rights.

Researchers' Rights

Researcher can use any of the registered variety under the Act for conducting experiment or research. This includes the use of a variety as an initial source of variety for the purpose of developing another variety but repeated use needs prior permission of the registered breeder.

Farmers' Rights

Farmers' Rights are ensured in India through several enabling provisions in the *PPVFR Act*, and the formulated rules and regulations thereof. These rights are being implemented by the Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA):

- A farmer who has evolved or developed a new variety is entitled for registration and protection in like manner as a breeder of a variety.
- Farmers' Variety can also be registered as an extant variety.
- A farmer can save, use, sow, re-sow, exchange, share or sell his farm produce including seed of a variety protected under the PPV&FR Act, 2001 in the same manner as he was entitled before the coming into force of this Act provided farmer shall not be entitled to sell branded seed of a variety protected under the PPV&FR Act, 2001.
- There is also a provision for compensation to the farmers for non-performance of avariety under Section 39 (2) of the Act, 2001. and
- Farmer shall not be liable to pay any fee in any proceeding before the Authority or Registrar or or the High Court under the Act.

Plant Genome Saviour Awards

Farmer, particularly the tribal and rural communities, who are engaged in the conservation of genetic resources of land races and wild relatives of economic importance and their improvement, shall be entitled to recognition and reward from the Gene Fund. So far a total of 202 Awards, Rewards and Recognitions have been conferred as per following details.

1. Plant Genome Saviour Community Awards (max. 5, consisting of a citation, memento and cash of INR One Million each): so far 45 farming Communities received the Awards.
2. Plant Genome Saviour Farmer Reward (max. 10, consisting of citation, memento and cash of INR 150,000 each): so far 69 farmers received the Reward.
3. Plant Genome Saviour Farmer Recognition (max. 20, consisting of citation, memento and cash of INR 100,000 each): so far 88 farmers received the Recognition.

Contribution of Women Farmers

Women farmers contribute in large number in conservation of seeds of traditional varieties and making available plant genetic resources for use. This system is vital to tackling global challenges of food security, sustainability, and economic growth, especially in low and middle income countries. Many women farmers groups and individual women farmers received the Award, Reward and Recognition as detailed below.

Plant Genome Saviour Community Awards

1. Shyamsunder Sister Nivedita Sangha, Village and P.O: Shyamsundar, Distt. Burdwan, West Bengal- (2010-11)
2. Deepaoli Women's Self Help Group, Village, Pudu Pattu Veeraappanur (Post), Taluk, Polur, Distt. Thiruvannamalai, Tamil Nadu- (2011-12)
3. Adarsh Mahila Atma Samooh, Patan, Achanakpur, Tarra, Durg, Chhattisgarh-(2015-16)
4. Community Seed Bank, Village: Manchoor, P.O. Jarasangham, Block, Zaheerabad, District, Sangareddy, Telangana-(2022-23)

Plant Genome Saviour Farmer Rewards

1. Smt. Anjamma, Gangwar, Zaheerabad, Medak, Telangana (2015)
2. Smt. MamtabaiDeoramBhangre, Akole, Deogaon, Ahmednagar, Maharashtra (2017-18)
3. Ms. Lahri Bai Padiya, Dindori, Madhya Pradesh (2021-22)

Plant Genome Saviour Farmer Recognitions

1. Swathi Samudaya Beej Bank, Tiptur, Distt. Tumkur, Karanataka (2007-08).
2. Smt. Phula Bai, Tikamgarh, Soriyana, Lar, Madhya Pradesh (2015).
3. Smt. Beni Bai, Tikamgarh Soriyana, Lar, Madhya Pradesh.
4. Smt. Rama Bai, Tikamgarh, Soriyana, Lar, Madhya Pradesh.
5. Smt. Parappy. A, Thiruvananthapuram, Kerala (2020-21).

Authority has received a total of 20,820 applications so far, of which 10,511 certificates have been issued. More than five thousand registration certificates have been issued to the farmers. Out of total applications of the farmers' varieties received more than 600 applications had been filed by the Women farmers, thereby indicating an important role of women in conservation and use of agro biodiversity.

Consultative Group on International Agricultural (CGIAR)

Introduction

The Consultative Group on International Agricultural Research, known globally as CGIAR, stands as the world's largest publicly funded agrifood research network. With an unwavering commitment to a food- and nutrition-secure future that leaves no one behind, CGIAR represents humanity's most ambitious collective effort to harness science for the benefit of smallholder farmers, vulnerable communities, and the planet, by delivering science and innovation that transform food, land, and water systems in a climate crisis.

Structure and Global Reach

CGIAR comprises 13 distinguished research centers operating across more than 70 countries with approximately 9,000 staff members. These centers include the International Rice Research Institute (IRRI) in the Philippines, the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, the International Livestock Research Institute (ILRI) in Kenya, and the International Food Policy Research Institute (IFPRI) in the United States, among others. Together, they form a truly global network addressing every dimension of agrifood systems.

The reach of CGIAR extends far beyond its centers through partnerships with more than 3,000 organizations worldwide, including national agricultural research systems, universities, farmer organizations, non-governmental organizations, and private sector companies. This extensive partnership network ensures that CGIAR science remains relevant, responsive, and grounded in the realities of farming communities.

The Smallholder and Gender Imperative

As hunger rises and climate impacts intensify, the 500 million small-scale producers who cultivate 83% of the world's farms remain central to global food security. Despite their importance, smallholders face persistent disadvantages including limited access to land, water, credit, inputs, information, and markets. They are disproportionately affected by climate change, environmental degradation, and economic shocks. Across Latin America and the Caribbean, Africa and Asia, including India, women play these indispensable roles. Yet persistent gender inequalities constrain productivity, resilience, and opportunity. Globally, underinvestment in women's skills and gender equality costs the world an estimated US $10 trillion annually, while women-led households face disproportionate climate-related losses.

The Gender Equality and Inclusion Accelerator

Through its Gender Equality and Inclusion Accelerator, CGIAR leads strategic and innovative research that advances gender equality, opportunities for youth, and social inclusion across food, land, and water systems. This initiative recognizes that gender-transformative change requires more than simply adding women to existing programs; it demands fundamental shifts in the

structures, norms, and relationships that perpetuate inequality.

The Accelerator integrates gender-responsive innovation through a combination of rigorous research, policy engagement, and capacity strengthening. CGIAR scientists work with partners to understand the barriers that women face, develop technologies and approaches that address those barriers, and generate evidence on what works to empower women in different contexts. This research informs policy at national and global levels, ensuring that gender considerations are integrated into agricultural development strategies and investments.

CGIAR's Commitment to Women in Agri-Food Systems

CGIAR's commitment to gender equality is evident across its research portfolio. Breeding programs develop crop varieties that meet women's preferences and reduce their labor burden. Agronomic research identifies practices that are accessible to women with limited resources. Value chain interventions strengthen women's roles as producers, processors, and traders. Policy research analyzes how policies affect women differently and advocates for more inclusive approaches.

In India and across Asia, CGIAR centers have worked for decades to understand and address the specific challenges facing women in agriculture. From IRRI's work on labor-saving technologies for rice farming to CIMMYT's research on women's participation in maize value chains, from ILRI's studies of women's roles in livestock systems to IFPRI's analysis of gender and nutrition linkages, CGIAR science has contributed to a deeper understanding of gender dynamics in agriculture and generated evidence to support more effective interventions.

Conclusion

As hunger rises and climate impacts intensify, the need for transformative scientific solutions in agriculture has never been more urgent. CGIAR stands ready to meet this challenge, building on decades of experience and a renewed commitment to gender equality and social inclusion. At GCWAS-2026, CGIAR brings its global expertise and local knowledge to bear on the critical task of empowering women in agri-food systems. Through partnership, innovation, and unwavering commitment to those who need it most, CGIAR continues to advance resilient, inclusive agrifood systems that benefit all women in households, communities, and economies

ICAR-Central Institute for Women in Agriculture (CIWA)

Through the Years: Leading Gender-Responsive Agricultural Transformation

The ICAR–Central Institute for Women in Agriculture (ICAR-CIWA) functioning under the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers Welfare, Government of India, is dedicated to advancing gender research and extension in agriculture. Established with the vision of promoting gender-responsive agricultural development, the Institute act as a catalyst for gender mainstreaming and women's empowerment to enhance agricultural productivity, resilience, and sustainability.

Based on the recommendations of the Working Group on Agricultural Research and Education during the Eighth Five Year Plan (1992–97), the Institute was initially set up as the National Research Centre for Women in Agriculture (NRCWA) in April 1996 at Bhubaneswar, Odisha, India. In 2007, All India Coordinated Research Project on Home Science, which was started during the 6th Five-Year Plan (1980-85), merged with NRCWA to combine the expertise of home science with agricultural research addressing the multifaceted challenges of women in agriculture across the states in India. Recognizing the need for a stronger focus on gender issues in agriculture, NRCWA was upgraded to the Directorate of Research on Women in Agriculture (DRWA) during 2008. Later, in 2014, as part of the 12th Five-Year Plan's implementation, DRWA was renamed as ICAR-Central Institute for Women in Agriculture (ICAR-CIWA), further elevating its status and strengthening its mandate emphasizing the institute's pivotal role in driving research and development initiatives aimed at empowering women in agriculture. Recently during 2022, the AICRP on H.Sc. evolved into the AICRP on Women in Agriculture (AICRP on WiA), aligning more closely with ICAR-CIWA's broader vision of promoting gender equality and empowering women within the agricultural landscape. A centre of AICRP on Ergonomics and Safety in Agriculture (AICRP on ESAAS) is also functioning at ICAR-CIWA with the mandate of application of ergonomic principles and anthropometric data for increasing productivity, reducing drudgery, and minimizing accidents and occupational health problems of workers in agriculture and allied sectors.

ICAR-CIWA is committed to gender research to mainstream and empower women farmers for enhanced productivity, profitability, and sustainability in agriculture. The institute has made significant contributions in generating evidences, developing women-centric and gender-responsive technologies, designing transformative research and equity-focused extension models, and strengthening grassroots institutional capacities to support all stakeholders.

Strengthening institutional ecosystem for gender mainstreaming within the National Agricultural Research, Education and Extension System (NAREES) is essential to systematically address persistent gender gaps and enhance the relevance and effectiveness of research, education, and extension for inclusive, equitable, and sustainable agri-food systems. In this direction, ICAR-CIWA has conceptualized and developed the Gender Strategy, along with the Gender Framework for 'Krishika Shakti' and Sustainable Agri-food Systems (GF-Krissa) and the Gender Framework for Sustainable Agri-food Systems and Empowerment of Women in Agriculture (GF-SAEWA). Further, in alignment with the Gender Strategy, ICAR-CIWA has developed a framework for strengthening gender-responsive agricultural research and extension through Nodal Officers-Gender Research & Extension in Agriculture (NO-GRA) in NAREES to promote gender equity in agriculture. In line with this national effort, ICAR-

CIWA has initiated a systematic capacity-building process through a series of structured training programs. As a significant step ahead, the Institute organized its first comprehensive five-day training program on 'Strengthening Agriculture Research with Gender Perspective for Sustainable Agri-Food System' during February 2026 for these NO-GRA, with a strong emphasis on translating the 'ICAR Gender Strategy' into actionable research, education, and extension frameworks that promote integration, inclusivity, and equity for sustainability in national agri-food systems.

Gender-disaggregated data in agriculture are often limited and scattered across multiple departments and sources, highlighting the need to integrate information from diverse platforms to support evidence-based policy, planning, monitoring, and gender-responsive interventions. In this context, the development of the National Information System for Women in Agriculture (NISWA) portal by ICAR-CIWA is a significant milestone, serving as a national repository of gender-disaggregated data on participation and time use from both primary and secondary sources, gender-responsive technologies and packages of practices (PoPs), methodologies, government schemes for farmers/women farmers, institutional gender factsheets, women innovators, along with other related resources. The Institute is in process of collection and development of a database on participation and time contribution of women and men in different agricultural activities across various states with active support of the AICRP on WIA centres. Recent findings indicated that women's participation either independently or jointly among rural agricultural households' averages 59.28% in crop production (16 surveyed states), 72.2% in horticulture (14 states), 68.34% in dairy (12 states), 67.33% in poultry (8 states), 75.52% in fisheries (8 states), 74.4% in forestry (8 states) and 69.2% in post-harvest activities (16 states), which signifies the active involvement of women in all sectors of agriculture (ICAR-CIWA, 2025).

Technologies in agriculture are often developed without adequately considering the gender-specific preferences and, needs, and constraints of women, limiting their access, adoption, and benefits and ultimately affecting overall societal development. Through participatory prioritization, co-design, testing, and refinement, the Institute has demonstrated that women farmers are active contributors to innovation rather than passive recipients. ICAR-CIWA and AICRP on Women in Agriculture (WIA) developed and validated a wide range of region-specific, women-friendly tools, equipment and small scale machines. These technologies are capable to reduce drudgery, enhance efficiency, improve safety, and increase productivity across studied agricultural operations across regions. The Institute has also developed process technologies such as, fermented fish silage manure, azolla-based poultry feed, green fodder-based animal feed, and weed-based bio-inputs to support low-input farming, etc. Additionally, AICRP on WiA centres has developed several food processing and value-added therapeutic food formulations, plant-based textile technologies, and protective clothing designs contributing to improved nutrition, health, livelihood, and drudgery reduction among farm families. The process technologies supported women/ women collectives in establishment of small-scale entrepreneurship for their livelihood.

ICAR-CIWA has made significant contributions in developing and demonstrating gender-responsive extension models and methodologies, including 'Gender Responsive Integrated Homestead Aqua-horticulture Model (GRIHA)', 'Gender Sensitive Agri-Nutri Farming System Model (GSAN)', 'Sustainable She-preneurship in Mushroom Cultivation Model (2S2M)', 'Gender-Sensitive Community-based Agripreneurship Model through Livestock and Fisheries Technologies (GCAM)', 'Gender Sensitive Village Level Para Extension Worker Model (VPEW)', 'Family Poultry Production Model for Nutrition and Income', 'Gender-Sensitive Model for Doubling Farmers' Income', 'Gender Responsive Climate Smart Agriculture Framework', 'Multi Agency Participatory Extension Model for Sustainable Backyard Poultry (MAPEM)', 'Gender-Sensitive Extension Model for addressing Livelihood, Nutrition and Entrepreneurship (GSEM)', 'Multi-storey and intercropping horticulture models', 'Gender-Inclusive approaches for Community Mango Orchards', JANANI Nutri-Garden Model, etc. All these models are primarily focusing on equity, location specific but scalable and address intersectional constraints related to access, skills, time constraints, and social norms, contributing to SDG 5 (Gender Equality) along with SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and well-being), and SDG 13 (Climate Action). Most of these models have demonstrated significant improvements in agricultural and gender indicators, particularly in production, productivity,

income, nutrition, and livelihood security across sectors along with enhanced participation of women in decision making and leadership roles.

The checklists for assessing the gender responsiveness of agricultural technologies by ICAR-CIWA and the methodology for the Livestock Farmers Livelihood Vulnerability Index (LLVI) in collaboration with ILRI have successfully been developed and to address the need for systematic, evidence-based tools that enable researchers, extension professionals, and planners to assess gender gaps in agricultural systems. These tools are helpful in identifying underlying techno-socioeconomic constraints faced by women and men, thereby guiding the development of gender-responsive technologies, inclusive program design, and effective monitoring and evaluation for equitable and sustainable livelihood outcomes in agriculture.

The Nutri-Smart Village (NSV) Program is an Innovative Program for Strengthening POSHAN Abhiyan, launched by ICAR-CIWA, Bhubaneswar during 2021 in 75 villages across 13 states with active involvement of AICRP on WIA centres, leading a significant improvement in nutritional knowledge, attitude & practices (KAP) level, improvement in nutritional status and reduction in prevalence of underweight and overweight in the study area. A total of ~4,000 nutri-gardens were also established under this program, promoting nutri-sensitive agriculture, nutrient-dense crops in nutri-garden thereby improving dietary diversity, entrepreneurship and livelihood upliftment of farm families. The 'Shree Anna Gram Programme' for nutritional security and women empowerment was initiated by ICAR-CIWA in 2023 in 30 villages in 13 states, involving AICRP on WiA Centres to mainstream the millets as a means to address nutritional and livelihood enhancement of farm families.

The case studies/surveys/ studies across regions indicated that women have limited access to farm tools and machinery, and also face financial constraints, which restrict their efficiency, and increase drudgery and time burden. To address these, the Institute formed women farmer interest groups (WFIGs)/ producer collectives (WFPOs/ WFPCs) to facilitate access to credit and subsidies thereby promoting mainstreaming of women and women-led agri-food systems. In order to promote entrepreneurship and leadership role amongst underprivileged women, the institute has conceptualized and established more than 100 small-scale women-led custom hiring centres (CHCs) in rural areas for better access to farm tools and small machines.

ICAR-CIWA technologies/ initiatives are improving productivity, reduced labour burden, facilitated easy marketing, and created local employment and entrepreneurship opportunities amongst women. Throughout its journey, ICAR-CIWA has remained committed to conducting action-oriented gender responsive research on emerging priorities such as climate change, organic and natural farming, digital agriculture, nutrition, and health. Extensive outreach activities are being carried out to address the varied technological, economic, and social challenges faced by women in agriculture. Its research and extension achievements demonstrated that integrating gender equity across the agricultural system enhances technology adoption, reduces drudgery, strengthens institutional responsiveness, and promotes equal participation and decision-making, thereby contributing to empower women in agri-food system.

Position Paper

Women in Agri-Food Systems: *Driving Progress, Attaining New Heights – A Position Paper*

Malavika Dadlani[1], Bimlesh Mann[2], Mridula Devi[3], Smita Sirohi[4], Pratibha Singh[5], Gurinderjit Randhawa[6], Shweta Singh[7] and Renu Swarup[8]

The Background

The representation of women in all spheres is critical for our success and growth, for meeting the Sustainable Development Goals (SDGs), and for maintaining gender diversity and parity. Unless there is equal representation, we will not be able to achieve our desired goals. Women, who constitute nearly 50 per cent of the population and contribute in all fields, especially agriculture, must have equitable representation. To meet our agricultural growth targets, the full participation of women is essential. Women are active in every aspect of agricultural development, from research to industry and farming, contributing to increased productivity and production. However, they remain significantly underrepresented, especially in leadership and decision-making positions, leading to a clear and persistent gender imbalance.

It is unequivocally agreed that women's empowerment is key to strengthening their participation in decision-making, which is crucial for socio-economic development. Research has shown that empowering women accelerates a country's economic growth. While we focus on empowering women in leadership, we cannot lose sight of the grassroots level. To build effective women leaders, implement gender-sensitive policies, and achieve progressive outcomes, we must nurture women leaders and empower women at the grassroots level, both technologically and socially.

For many years, we have discussed gender diversity and agreed on the need for more women in leadership and decision-making roles. We have also agreed on the need for empowerment to facilitate this process effectively. What we now need is to collectively deliver on the ground.

Despite women's indispensable role in agriculture their representation in decision-making remains disproportionately low. Structural barriers, including male-dominated extension services, unequal access to technology, and entrenched social norms, systematically exclude women from leadership roles and policy influence. While many fora have raised awareness on these issues, progress remains stalled by implementation gaps, resources disparities and institutional biases. Poor policy enforcement and limited grassroots reach, coupled with restricted access to markets, training, and digital tools, place the women farmers at disadvantage. Leadership programs often overlook rural women, focusing instead on urban elites. This imbalance not only undermines gender equity but also constrains agricultural productivity, innovation, and progress toward the SDGs (2, 5, and 8). Empowering women in agriculture not only helps achieve these goals but also enhances productivity, drives innovation, and promotes sustainability.

Since agrifood system encompasses the entire value chain that brings food from the farm to our tables, and even beyond, all the activities, viz., producing, processing, distributing, and consuming food and other agricultural products, need to be paid focused attention. Women play an important role in all aspects from primary food production (crops, livestock, forestry, aquaculture, fisheries) to post-

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harvest handling, transportation, processing, and ultimately, consumption and disposal. Understanding the complexities of agri-food systems is crucial for addressing global challenges related to food security, environmental sustainability, and economic development. Agri-food systems play a potentially central role in driving economic growth and transformation in low- and middle-income countries. It needs to be emphasized that every segment of the agri-food system is linked, and changes in any segment can affect the entire system. Agri-food systems need to be sustainable, ensuring food security while minimizing environmental impact and promoting social equity; and to be resilient to shocks like climate change, disease outbreaks, or economic instability. They affect livelihoods, food security, and access to nutritious food for all. Also, it is important to move towards a more circular agrifood system that minimizes waste and utilizes the byproducts as resources. It is imperative to recognize the contributions of the women farmers to agrifood systems.

An Inclusive Definition of the Woman Farmer

Women farmers work in diverse roles across agrifood systems and come from all backgrounds: young and old, women in local communities, women with disabilities, and refugee and displaced women. They include smallholder farmers, peasants, agricultural labourers, fishers and fish workers, beekeepers, pastoralists, processors, traders, agri-entrepreneurs, custodians of traditional knowledge, as well as those engaged in agricultural research, innovation and development (ARI4D), and those working across both formal and informal sectors, with or without ownership of land.

According to FAO data, women make up a significant share of the world's agricultural workforce and are indispensable across agrifood value chains- from production and processing to distribution and trade, playing a central role in household food security and nutrition. In 2021 agrifood systems employed 40 per cent of working women globally. Despite this, women's contributions remain undervalued and their working conditions are often more precarious, being irregular, informal, part-time, low-paid, labour-intensive, and highly vulnerable. They continue to face systemic barriers, including limited access to land, finance, technologies, education, extension services, and participation in decision-making at all levels. The FAO stated that "The cost of inaction is enormous. We know from recent estimates that closing the gaps between men and women in agriculture could raise global GDP by one trillion dollars and reduce food insecurity for 45 million people,

It is therefore imperative to bring policy attention to the multidimensional challenges faced by women farmers and also promote legal reforms and policy and programmatic action that allow women to have equal land rights, and equal access to finance, technology, extension services, markets, and decision-making.

The UN General Assembly, declared 2026 as the *International Year for Woman Farmer* with an aim to spotlight the realities faced by women farmers and drive policy reforms and investment to advance gender equality, empower women, and build more resilient agrifood systems. This global campaign is aimed at recognizing women's indispensable yet often overlooked contributions to global agrifood systems and to galvanize efforts to close persistent gender gaps. It also serves as a global milestone that can spark policy reforms, public awareness campaigns, and international collaboration, while also providing an opportunity to mobilize resources, forge partnerships, and create a shared agenda for advancing women's role in agriculture. Access to modern agricultural technologies, training programs, and digital tools can further improve women's efficiency, increase their incomes, and consolidate their role in decision-making, with digital platforms offering ways to amplify their voices and link them to broader markets. Social protection schemes tailored for women farmers, such as crop insurance, maternity benefits, and pension plans, can enhance their resilience and economic security. Better rural infrastructure like roads, storage, and clean energy can reduce their workload and increase productivity.

Women as the Backbone of the Agrifood Workforce: The Indian context

If we examine the data from India, as per the Periodic Labour Force Survey (PLFS) 2023-24, agriculture and allied activities employ 46.1% of India's total workforce (persons aged 15 years and above). Women's participation is particularly high in rural areas, where 76.9% of rural female workers are engaged in agriculture, compared with 59.8% of rural male workers, underscoring women's critical role in sustaining agricultural livelihoods and rural

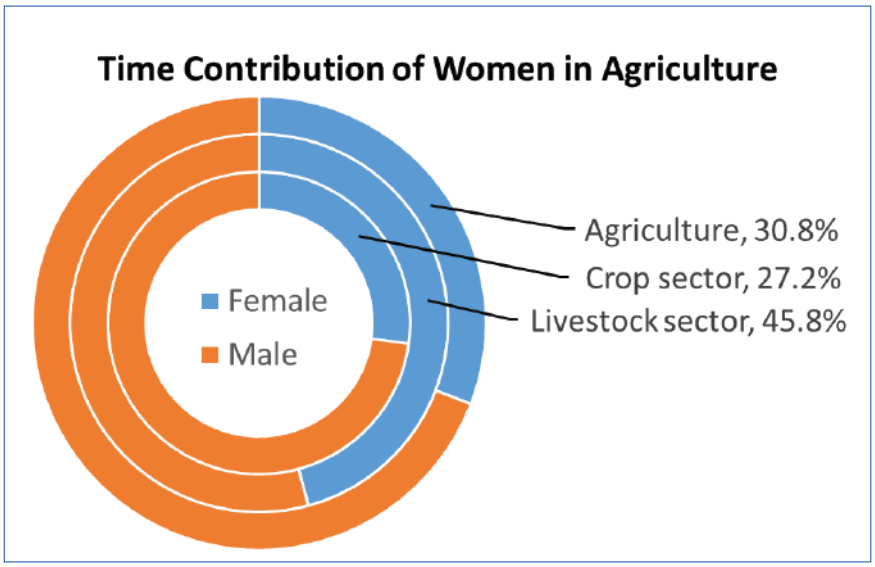
economies. In crop production, including horticulture, women account for approximately 31% of the rural agricultural workforce. Time-use study data indicates that women spend an average of 274 minutes per day on crop-related activities, compared with 330 minutes for men, and contribute an estimated 27.2% of total crop output. This data highlights the need for targeted interventions to reduce gender-based constraints in labour productivity, access to resources, and extension services in order to promote inclusive and sustainable agrifood systems (NSO, 2020; Kumar et al., 2022).

Recent findings from the All India Coordinated Research Project on Women in Agriculture (AICRP-WIA) indicate that women's participation in crop production either independently or jointly among rural agricultural households averages 59.28% across 16 surveyed states. Participation is particularly high (90% or above) in states such as Arunachal Pradesh, Sikkim, Nagaland, and Bihar, reflecting women's central role in subsistence-oriented farming systems. In contrast, substantially lower levels of female participation are reported in states such as Punjab (8.67%), Maharashtra (36.17%), and Rajasthan (38.42%), where higher levels of mechanization and the predominance of male-led commercial agriculture are more prevalent. These patterns point to marked regional variation in gender roles within India's crop production sector (ICAR-CIWA, 2025).

In the horticulture sector, women participate across a wide range of activities, including nursery raising, irrigation, weeding, post-harvest processing, homestead fruit cultivation, orchard operations (such as digging and irrigation in apple orchards), and processing activities such as shelling, peeling, and grading in cashew, as well as intercultural operations and oil extraction in oil palm plantations. Women's participation in horticultural activities either independently or jointly within rural agricultural households is particularly high in several states, including Arunachal Pradesh, Sikkim, and Bihar, where participation exceeds 90%, underscoring women's central role in fruit and vegetable production systems. In contrast, Haryana records the lowest level of women's participation in horticulture (30.45%), reflecting the predominance of cereal-based cropping systems and lower diversification into horticultural enterprises. Overall, an average of 72.2% of women across 14 surveyed states are engaged in horticultural activities, highlighting the importance of gender-responsive interventions in horticulture value chains to enhance productivity, incomes, and nutrition outcomes (ICAR-CIWA, 2025).

Women constitute approximately 49% of the rural workforce and contribute about 45.8% of total work time in the livestock sector, a share that is substantially higher (27.2%) than their contribution in crop production (NSO, 2020; Kumar et al., 2022). Rural women are engaged across a range of livestock-related activities, spending an average of 129 minutes per day on tasks such as feeding, milking, fodder management, animal health care, and the processing of dairy products (NSO, 2020; Kumar *et al.,* 2022). Women play a particularly prominent role in dairy, rural poultry, and small ruminant production,

A total of 44.4% of rural households depend on agriculture, either self-employed (36.2%) or casual labour (8.2%) in agriculture.



Based on total female workforce (rural + urban): **64.4% of total female workers** (all age groups) are involved in agriculture.
Based on total female workforce (R): **76.9% of total rural female workers** (all age groups) are involved in agriculture.
Based on total male workforce: 37.1% R+U and **59.8% rural total male workers** (all age groups) are involved in agriculture. **(PLFS, 2023-24)**

where they are involved in most operational activities, from feeding to marketing. Women's participation in livestock enterprises either independently or jointly among rural agricultural households averages 68.34% in the dairy sector (across 12 states) and 67.33% in rural poultry (across 8 states). However, participation levels vary widely across regions. In dairy activities, women's involvement ranges from 37.3% in Rajasthan to over 90% in Assam and Himachal Pradesh. In poultry sector, participation ranges from 34.93% in Punjab to more than 90% in North-Eastern states viz. Arunachal Pradesh, Assam, Meghalaya and Tamil Nadu. These regional variations highlight the need for context-specific, gender-responsive livestock development strategies (ICAR-CIWA, 2025).

The fisheries sector in India supports the livelihoods of approximately 28 million people, with women making substantial contributions across marine and inland systems. Women account for 47 percent of the 4.9 million marine fisher folk and 44 per cent of the 23 million inland fisherfolk (DoF, 2023). Their engagement is concentrated in post-harvest activities, where women comprise 90 percent of the workforce in curing and processing, 95 percent in shrimp peeling and pre-processing, and 52 percent in net making. At the state level, Andhra Pradesh reports the highest participation of women in curing and labour activities, while Kerala records the largest share in shrimp peeling (CMFRI-FSI-DoF, 2020). Across the eight surveyed states, women's independent or joint participation in fisheries averages 75.52 percent, exceeding 80 percent in Arunachal Pradesh, Bihar, Karnataka and Himachal Pradesh (ICAR-CIWA, 2025).

Women's participation (working either independently or jointly) in forestry (74.43% across eight states) is high in Nagaland, Himachal Pradesh, Meghalaya, Bihar, Odisha and Telangana (>80%). Sericulture also shows significantly higher women's participation (working either independently or jointly) in rural agricultural households (74.35% across four states) among sectors, particularly in states like Himachal Pradesh (95.75%), Meghalaya (95.32%), and Assam (88.11%), highlighting women's active presence in labour-intensive allied activities.

Women's involvement (alone and jointly) in post-harvest activities is also at similar pace compared to other production activities, with an overall participation of 69.20% across 16 states. States like Arunachal Pradesh, Sikkim, and Nagaland showed complete or near-complete participation (≈100%), highlighting women's dominance in processing, storage, and value addition tasks. Lower participation is observed in Maharashtra (23.72%) and Punjab (28.73%), pointing to regional disparities in participating post-harvest activities.

> Women contribute 53.2% of total labour requirement (for all household activities and agriculture) in the agricultural households as compared to 46.8% by men (Rural), indicating higher workload on women members of family in India.

Beyond primary production, women are key contributors to natural resource management, with responsibilities spanning land, water and forest stewardship and the application of indigenous knowledge to support sustainable resource use. However, their contributions are frequently constrained by limited access to productive resources and inputs, including irrigation, green fodder, manure and other essential services. Women's engagement is particularly prominent in organic horticulture, particularly in compost preparation (75.67%), nursery management (68.34%), while men dominate in input procurement (80%), loan & subsidy formalities (58.67%), and land preparation (50%) during preparatory phase; in planting, transplanting (64.67%), and harvesting (60.34%) during crop development phase and in sorting and packaging (60%), during post-production phase (ICAR-CIWA, 2024).

Women are key actors across agricultural value chains, from production to post-production, and their roles are central to food security outcomes. The four pillars of food security - availability, access, utilisation and stability are intrinsically gendered, and imbalances within these dimensions disproportionately affect women and children. Evidence from NFHS-5 (2019-21) highlights persistent nutrition challenges in India: 35.5 percent of children are stunted, 32.1% underweight, and 67.1% anaemic; among women, 57.2% are anaemic, 56.7% have a high-risk waist-to-hip ratio, 24.0 percent are obese, and 18.7% are underweight. These indicators point to a dual burden of malnutrition and diet-related health risks, with higher prevalence in rural areas. Despite the implementation of multiple government programs, malnutrition and micronutrient deficiencies persist, underscoring the need for gender-responsive, nutrition-sensitive agricultural strategies. Interventions such as crop

diversification, biofortified varieties, homestead nutrition gardens, targeted nutrition and health education, and gender sensitisation can strengthen household food availability and improve nutrition security, particularly among rural farm families.

Women in rural India carry dual workload, combining unpaid domestic and care responsibilities with agricultural activities, yet their contributions remain largely unrecognized and undervalued both within the households and communities. While women spend fewer hours in agricultural work (3.9h per day) than men (5.2h), their total work burden is substantially higher (9.5h, compared with 7.9h for men), reflecting the disproportionate share of unpaid domestic and care work they perform (Kumar *et al.,* 2022). This cumulative workload, sustained across crop seasons, negatively affects women's health, well-being and opportunities for social and economic participation (Vermireddy and Pingali, 2021). Addressing these disparities requires transformative changes in gender norms, particularly to redistribute domestic and care responsibilities more equitably.

Women in the Development Pyramid: India in the Global Context

At present, there are nearly 432 million women of working age in India, out of which ~343 million are employed in the unorganized sector. Women have traditionally played a significant role in environmental conservation and management, particularly in rural communities where they often rely on natural resources for their livelihoods and well-being.

Women's Role in the Agriculture Development Pyramid

The challenges faced by women in Indian agri-food systems are largely consistent with global trends in developing countries form the vast base of the agricultural labor force but are concentrated in the lower tiers of resource access and decision-making due to systemic gender disparities. This phenomenon is often termed the "feminization of agriculture". The "agriculture development pyramid" can be conceptualized in tiers of pyramid, from fundamental labour to ownership and policy influence.

Base of the Pyramid: The Workforce

» High Participation: Women constitute a substantial portion of the agricultural workforce both in India and globally. In India, approximately 80% of all economically active women are engaged in agriculture, with recent surveys indicating women make up around 64.4% of the total agricultural workforce. Globally, women account for about 43% of the agricultural labor force, growing 60-80% of the food in developing countries.

» Labor-Intensive Roles: Women primarily engage in labour-intensive and manual operations such as sowing, weeding, harvesting, post-harvest processing, and livestock management.

Middle Tier: Resource Access and Management

» Ownership Disparity: This is where a significant gap exists. Despite their high participation, women own only about 14% of agricultural land in India, with some data suggesting figures as low as 8.3%. Globally, women own less than 15% of the land. This lack of land titles limits their access to institutional credit, government subsidies, and insurance schemes designed for registered farmers.

» Limited Technology & Training: As in most countries, in India women face barriers to accessing modern technology, quality inputs, and agricultural extension services due to lower literacy rates, restricted mobility, and training programs often designed for men.

Top Tier: Decision-Making and Leadership

» Invisible Labour: Women's work is often unpaid and unacknowledged, categorizing them as "agricultural labourers" rather than independent "farmers" or decision-makers.

» Low Representation: Women have limited representation in farmers' organizations, cooperatives, and decision-making bodies at local, regional or national levels and in framing public policy. In India, women account for less than 5% of professionals in the agribusiness sector.

In response, both India and the global community are initiating gender-specific interventions, such as the UN declaring 2026 as the International Year of the Woman Farmer, and Indian government schemes focusing on women's Self-Help Groups (SHGs) and access to credit and technology to address these disparities.

Mapping Gender Gaps in Agrifood Systems

Globally, 36% of working women are employed within agrifood systems, a share comparable to men; however, women's roles are often more informal, low-paid, and insecure. Women engaged in wage employment in agriculture earn only 82 cents for every dollar earned by men (FAO, 2023). Despite their centrality, extensive evidence shows that women face persistent structural and institutional inequalities that limit their ability to benefit equitably from agrifood systems or influence their transformation. Closing these gaps is not only a matter of social justice but also a strategic imperative for enhancing productivity, resilience, and sustainability (FAO, 2011; World Bank, 2020).

Inequitable Access to and Control over Productive Resources

One of the most persistent gender gaps in agrifood systems relates to women's limited access to and control over productive resources, particularly land. Across low- and middle-income countries, women are significantly less likely than men to own land or hold secure tenure rights, despite their substantial contribution to agricultural labor (Doss *et al*., 2015). In India, the Agriculture Census (2015–16) reports that women constitute only 13.98% of operational landholders compared to 86.02% for men. Further, 72% of women-operated holdings fall under the marginal category, with an average size of just ~ 0.35 hectares. Discriminatory inheritance practices, customary norms, and gender-biased land administration systems continue to undermine women's land rights, limiting their economic autonomy and decision-making power.

Insecure land tenure reduces women's incentives to invest in soil conservation, climate adaptation, and productivity-enhancing technologies (Meinzer-Dick *et al.,* 2019). Women also face significant barriers in accessing financial services due to lack of collateral, limited mobility, exclusion from formal banking systems and social barriers. As a result, women farmers and agrifood entrepreneurs struggle to access credit, insurance, and savings products needed for investment, diversification, and risk management (Demiurgic-Kunt *et al.,* 2018). These constraints heighten vulnerability to climate shocks and market volatility, reinforcing cycles of poverty and exclusion.

Gender Gaps in Knowledge, Technology, and Extension Services

Agricultural innovation and knowledge systems are critical drivers of agrifood transformation, yet they remain deeply gender unequal. Women farmers consistently receive less information, fewer extension visits, and lower-quality advisory services than men (Ragasa *et al.*, 2019). Extension programmes often target men as household heads, overlooking women's substantial roles in crop production, livestock management, and post-harvest processing. Unequal access to inputs, credit, extension services, and technology contributes to a 24% productivity gap between women and men farmers.

Closing gender gaps in access to resources and knowledge could increase women's farm yields by 20–30%, with significant implications for household food security and national output (FAO, 2011). While digital tools such as mobile advisory services, climate information platforms, and e-commerce offer new opportunities, gender digital divides persist. Women are less likely to own mobile phones, access the internet, or possess digital literacy skills, particularly in rural areas. Challa (2025) identified poor connectivity (81.67%), low literacy (80%), women's dual work burden (76.67%), lack of training (70.83%), and difficulty using ICT tools (66.67%) as key constraints limiting women's effective use of digital extension services.

Labour Inequalities, Time Limitation, and Social Responsibilities

Women's engagement in agrifood systems is shaped by unequal labor dynamics and a disproportionate burden of unpaid domestic and family care responsibilities, including food preparation, childcare, water and fuel collection, and elder care. Time-use studies show that when unpaid work is included, women work longer total hours than men and often face severe time constraints. During peak agricultural seasons, women may work for 14–18 hours per day with minimal rest (Ferrant *et al.,* 2014). These time limitations restrict women's participation in training, paid employment, leadership roles, and market engagement. Where women are employed in agrifood value chains, they are often concentrated in informal, seasonal, and low-paid activities such as harvesting, sorting, and processing. Occupational segregation and persistent gender wage gaps reflect discriminatory norms and limited opportunities to

skill development (ILO, 2021). Male outmigration in many regions has further intensified the feminization of agriculture, increasing women's workloads and managerial responsibilities without corresponding gains in rights, assets, or institutional support.

Market Access and Value Chain Exclusion

Women's participation in agrifood markets is constrained by limited access to market information, transport, storage facilities, and producer organizations, which weakens their bargaining power. Cultural norms in many contexts restrict women's mobility and interactions with male traders, compelling them to sell produce at farm gates or through intermediaries at lower prices (Fischer and Qaim, 2012). Women-led enterprises also face challenges in meeting quality standards, accessing certification, and scaling operations due to limited capital and technical support. Consequently, women are frequently excluded from higher-value nodes such as aggregation, processing, branding, and export markets. Evidence suggests that inclusive value chains that actively support women's participation generate more equitable and resilient outcomes (KIT *et al.,* 2016).

Nutrition, Health, and Intra-Household Food Allocation

Gender inequalities in agrifood systems have significant implications for nutrition and health outcomes. Although women play a central role in food preparation and caregiving, they often lack control over household income and food allocation decisions. In food-insecure households, women and girls frequently eat last and least. Studies show that when women control agricultural income, household expenditure on nutritious food, healthcare, and education increases, leading to improved child nutrition and intergenerational wellbeing (Ruel *et al.,* 2018). Addressing gender gaps in agrifood systems is therefore essential for reducing malnutrition and hidden hunger alongside improving productivity.

Under-representation in Leadership and Decision-Making

Women remain under-represented in leadership and governance structures across agrifood systems, from local cooperatives and water user associations to national ministries and global policy platforms (Meinzer-Dick *et al.,* 2014). Pandey *et al.* (2021) found that only about 45 per cent of women enjoy equal decision-making status within households, reflecting entrenched patriarchal norms. This exclusion has important policy implications. Women's participation in governance is associated with more inclusive resource allocation, stronger attention to nutrition and sustainability, and improved collective outcomes (Pandolfelli *et al.,* 2018). Persistent under-representation therefore perpetuates policies and institutions that fail to reflect women's priorities and lived realities.

Intersecting Vulnerabilities, Education, and Climate Dimensions

Gender gaps in agrifood systems intersect with poverty, ethnicity, age, disability, migration status, and geography. Indigenous women, smallholder farmers, pastoralists, migrant workers, and women in fragile or conflict-affected contexts face compounded exclusion. Limited access to education and skills development further restricts women's participation in higher-value agrifood activities, particularly for young rural women entering the labor market.

Climate change intensifies these vulnerabilities. Women are disproportionately affected by climate-related shocks due to reliance on natural resources and limited access to adaptation technologies, extension services, and climate finance. Despite their extensive indigenous knowledge and adaptive practices, women remain underrepresented in climate planning and decision-making (Nasimi *et al.,* 2017). Structural barriers such as insecure land tenure and financial exclusion continue to limit women's participation in climate-smart agriculture and green value chains.

Bridging the Gaps: Equitable Pathways for Transformation

Strengthening Rights and Institutional Frameworks

Securing women's land and property rights is foundational for equitable agrifood systems. Joint land titling, gender-sensitive land registration, and legal literacy programmed have been shown to enhance women's tenure security and investment incentives (Deininger *et al.,* 2019). Financial inclusion strategies must promote gender-responsive credit, savings, insurance, and climate finance products that reflect women's needs and constraints.

Gender-Responsive Knowledge and Innovation Systems

Agricultural research, education, and extension systems must deliberately target women farmers, workers, and entrepreneurs. Recruiting female extension agents, adapting training schedules, aligning content with women's roles, and investing in digital inclusion are critical to ensuring that innovation does not reinforce existing inequalities. Strengthening women's access to education, vocational training, and digital skills is particularly important for enabling participation in emerging agrifood and green economy opportunities.

Inclusive Markets, Leadership, Data, and Accountability

Strengthening women producer organizations, supporting women-led enterprises, and promoting leadership through quotas for women, mentorship, and networking can help bring structural change. Equally important is improving the data systems. Collecting sex-disaggregated data, conducting time-use surveys, and incorporating gender indicators into monitoring frameworks are needed for evidence-based policymaking and accountability.

The Transition: From Homemakers to Decision Makers

Transforming women's roles in agrifood systems requires a fundamental shift in how societies value women's work, knowledge, and leadership. Historically, women's contributions to food systems have remained largely invisible because they occur within households and informal economies. Yet their contributions are central to food security, nutrition, and resilience. Moving women from the margins of agrifood systems to positions of influence and decision-making is not merely a social aspiration; it is an economic, nutritional, and environmental necessity.

Acknowledging Role of Social Responsibility in Agrifood Systems

Recognition of social responsibility as a core component of agrifood systems is the foundation for women's empowerment. Globally, women perform approximately three-quarters of unpaid social and domestic work, spending on average 2.8 times more hours than men on food preparation, water and fuel collection, childcare, and nutrition management (ILO, 2018; UN Women, 2020). In rural and agrarian contexts, these responsibilities directly shape food utilization, dietary diversity, and household health outcomes.

Research consistently demonstrates that women's control over food preparation and household decision-making significantly improves nutrition outcomes. A multi-country FAO study (2011) found that increases in women's income lead to greater household spending on food, health, and education than equivalent increases in men's income. Women in Agrifood Entrepreneurship

Women's increasing involvement in agrifood entrepreneurship marks a critical transition from subsistence and household roles to market-oriented and decision-making positions. Women account for nearly 40 percent of the global agricultural labour force, with even higher participation in food processing, retailing, and informal food markets in low- and middle-income countries (FAO, 2023).

Women-led enterprises in food processing, value addition, and local marketing generate employment, raise household incomes, and strengthen local food systems. Evidence from Sub-Saharan Africa shows women's dominance in small-scale agro-processing sectors such as milling, dairy, fish processing, and horticulture, supplying affordable and nutritious foods to urban and peri-urban markets (World Bank, 2019). Importantly, women entrepreneurs often prioritize nutrition-sensitive and sustainable business models. Studies from South Asia and East Africa indicate that women-led agrifood enterprises are more likely to invest in diversified crops, biofortified foods, and environmentally sustainable practices (Quisumbing & Doss, 2021).

Despite these gains, structural barriers persist. Women face a gender productivity gap of 20–30 per cent in agriculture due to unequal access to land, credit, inputs, extension services, and markets (FAO, 2023). Closing this gap could raise global agricultural output by up to 4 percent and reduce the number of undernourished people by as many as 150 million (FAO, 2011).

Inclusive Governance: The Role of Women in Collective Leadership

Women's leadership in collective institutions—self-help groups, cooperatives, producer organizations, and community-based natural resource management groups—demonstrates their capacity to negotiate markets, manage resources, and influence local policy. These platforms often

serve as stepping stones toward higher-level decision-making.

Evidence from India's self-help group movement shows that women's collective action improves access to finance, strengthens bargaining power, and increases participation in local governance. Similarly, women's participation in agricultural cooperatives has been linked to higher farm incomes, improved technology adoption, and stronger market integration (Meinzen-Dick *et al.,* 2014).

Beyond economic gains, collective leadership enhances natural resource governance. Research from Nepal and Ethiopia shows that forest user groups with women in leadership positions demonstrate better rule compliance, more equitable benefit-sharing, and improved environmental outcomes (Agarwal, 2010). These findings challenge persistent assumptions about women's capacities and highlight the transformative potential of inclusive institutions.

Women as Catalysts of Sustainable and Resilient Food Systems

Women are uniquely positioned to drive sustainability and resilience due to their intimate knowledge of local ecosystems and household nutrition needs. Across regions, women play a central role in seed selection, crop diversification, livestock management, and post-harvest processing—activities critical for biodiversity conservation and climate resilience.

Studies have shown that women farmers are more likely to adopt climate-resilient practices such as intercropping, agroforestry, integrated farming systems, water conservation, and soil health management when they have access to resources and decision-making authority (Doss *et al.,* 2018). Women are also custodians of traditional knowledge related to indigenous crops and wild foods, increasingly recognized as vital for climate adaptation.

Women are often early adopters of nutrition-sensitive agriculture, integrating diverse crops, livestock, and kitchen gardens to improve household diets. Evidence from homestead food production programs in Bangladesh and Africa shows significant reductions in anaemia and vitamin A deficiency when women lead diversified food production (Ruel *et al.,* 2013).

In the context of climate change, women's leadership is especially critical. Although women are disproportionately affected by climate risks due to land insecurity and limited assets, they are powerful agents of adaptation and mitigation. CARE (2020) finds that climate interventions are more effective and sustainable when women participate meaningfully in planning and governance. By linking productivity with health, equity, and environmental protection, women's leadership aligns agrifood systems with broader sustainable development goals.

Empowering Women in Agriculture

Recognizing that empowerment of women is necessary to change the face of agriculture and the rural sector, there is a growing realization and commitment of the global community to achieve more sustainable and broad-based agricultural growth by addressing gender-related issues in agriculture through national, regional and global initiatives and partnerships. There is also a greater degree of coordination, consultation and convergence of initiatives undertaken by the international institutions – Consultative Group on International Agricultural Research (CGIAR), Global Forum on Agricultural Research (GFAR), Food and Agriculture Organization of the United Nations (FAO), regional forums and many national agricultural research systems. One of the important global initiatives for transforming agriculture to empower women and deliver nutrition and income security was taken by the GFAR, called Gender in Agriculture Partnership (GAP). The GAP highlights the role of men and women as producers, developing participatory processes, addressing social norms and power relations in creating disparities, and puts a spotlight on women farmers as the backbone of agricultural and rural sustainability. The GFAR, among its many roles, works to highlight the important work of women farmers – as food producers, nutrition providers and caretakers, as scientists, innovators and teachers in villages and cities, in governments and in leadership roles in NGOs and as progressive farmers. Globally, gender equality has become an integral part of the R&D programmes being implemented by international organizations, NGOs, government agencies and International Agricultural Research Centres (IARCs) through the CGIAR Research Programme (CRP) on Gender.

India is at the forefront in acknowledging the role of women in agriculture. It established the world's first National Research Centre for Women in

Agriculture (now ICAR-Central Institute for Women in Agriculture) in Bhubaneswar in 1996. The center has been engaged in developing methodologies for identification of gender implications in farming systems approaches and developing women-friendly technologies under different production systems. Empowerment processes are strengthened through educational interventions, transfer of technologies, feasibility trials and knowledge-sharing. The center also emphasizes undertaking vocational training to impart skills necessary to undertake different vocations and relieve women from drudgery by providing time- and labour-saving tools and equipment. Empirical evidence suggests that women have moved from beneficiaries to active partners in shaping empowerment.

Ensuring Visibility of Gender

Despite growing evidence of the substantial role women play in agriculture and in ensuring household food and nutritional security, many policymakers, agricultural scientists, and development professionals still fail to fully recognize their contributions. Consequently, agricultural policies and research and development (R&D) programs in many countries remain gender-blind, overlooking both the importance of women's work and the complexity of the social, economic, and cultural barriers that limit their ability to contribute effectively to their families and society. Paradoxically, many rural women themselves are not fully aware of the economic and social value of their labor and are often hesitant to seek recognition or claim their rights.

The invisibility of rural women stems largely from societal neglect, particularly from agricultural policymakers and professionals. This marginalization contributes to the underperformance of the agricultural sector as a whole. Addressing these challenges requires complementary strategies and mechanisms to enhance women's visibility and participation in: (i) agricultural value chains, including crops, horticulture, livestock, forestry, and fisheries; (ii) household food, nutrition, and health security; and (iii) research, education, extension services, and policy-making institutions. Moreover, it is essential to generate robust quantitative and qualitative evidence to demonstrate the value of women's contributions and to amplify their voices in decision-making processes at all levels. Promoting women's leadership in strengthening the social fabric of society is critical to achieving inclusive and sustainable agricultural development (IFAD, 2013).

From Farms to Markets: Strengthening Women's Market Linkages through SHGs, Cooperatives, Mandis, and E-Markets

Across much of the developing world, women form the backbone of agri-food systems. However, once production moves into the market sphere, women's visibility tends to diminish. The journey from farm to market remains uneven and fragmented for women farmers, shaped by limited mobility and severe time constraints, lower access to working capital, fewer productive assets in their own names, weaker bargaining power, inadequate access to market information, and persistent institutional blind spots.

The disconnect between working in agriculture and being recognized as a farmer has direct implications for market participation, as most market institutions—membership norms, licences, procurement systems, and payment mechanisms—continue to be anchored in land titles and formal identity. As a result, while women contribute a substantial share of agricultural labour and management, they capture a disproportionately small share of the value generated along agri-food value chains.

Strengthening women's market linkages, therefore, is not merely about raising incomes; it is about reworking the pathways from farms to markets so that women can participate meaningfully, negotiate effectively, and exercise leadership. Over the decades, multiple institutional routes have emerged to address this gap. Self-Help Groups (SHGs), cooperatives and producer collectives, and more recently digital and e-markets, have each attempted—through different mechanisms—to connect women producers to markets. Each pathway offers distinct strengths, but each also carries limitations that must be recognised and addressed if women are to move from the margins to the centre of agri-food markets.

SHGs: The First Rung of Market Participation

For millions of rural women, Self-Help Groups (SHGs) have represented the first collective step beyond subsistence production and informal exchange. Initially formed as savings and credit groups, SHGs have evolved into platforms where women build confidence, gain financial literacy, and develop a collective voice. They enable members to pool small surpluses of farm and livestock products—such as vegetables, grains, milk, and processed

foods—and engage more effectively with local markets. In India, this movement has expanded to a remarkable scale. Under the *Deendayal Antyodaya Yojana*–National Rural Livelihoods Mission (DAY–NRLM), more than 9.09 million Self-Help Groups (SHGs), encompassing over 100 million women (as of October 2024), have been mobilized across the country. For many women, participation in SHGs represents their first opportunity to manage cash, maintain financial records, engage directly with banks, and recognize themselves as economic actors beyond the confines of the household. SHGs enhance women's market participation by aggregating small surpluses, strengthening bargaining power through collective sales, and promoting value addition in products such as pickles, spice mixes, snacks, and millet-based foods, which often yield higher returns than raw produce. However, their market engagement frequently remains limited to local haats and nearby buyers. Constraints related to quality standards, packaging, storage, transport, and fulfilling regular bulk orders restrict further expansion. Strengthening market infrastructure and linking SHGs to federations, producer companies, procurement systems, and digital platforms will be essential to move beyond low-volume, low-value trade while preserving the social capital that underpins their success.

Cooperatives and Producer Collectives: Scale and Stability

Cooperatives are among the most effective ways to organise scattered small producers into strong market players. In India, this is especially evident in dairying: women make up nearly 70% of the dairy workforce and about 35% of active cooperative members. Over 48,000 women-led village dairy cooperatives ensure assured procurement, transparent pricing, and timely payments. Women-only cooperatives and women-led Farmer Producer Organizations (FPOs) open up leadership spaces, normalise women's role in business decisions, and lower social barriers that often silence them in mixed settings. Global evidence, including studies by the World Bank and International Fund for Agricultural Development (IFAD), shows that when women actively participate in producer organizations, gains are more likely to improve household nutrition, health, and education. Kerala's Kudumbashree Mission demonstrates what sustained institutional support can achieve. With extensive women farmer groups, expanding cultivation, and a push towards value addition and branding, it shows that when women's collectives are linked to local governments, credit, technology, and markets, they move from subsistence activity to stable enterprise

Mandis: Access without Agency

In India, regulated agricultural markets (*mandis)* still drive price discovery and trade. For many women farmers, however, *mandis* remain distant and male-dominated. Mobility constraints, time poverty, social norms, and limited access to information and documentation restrict their direct participation.The result is a critical gap: women may have market access through the household, but not market agency as individuals. When men transact in mandis, women miss out on learning about prices, grades, and buyer preferences—reinforcing long-term dependence in marketing decisions. To make mandis work for women, practical fixes matter: safe transport, toilets and childcare, transparent price and grade displays, reliable weighing and payments, and designated spaces for women sellers and SHG/FPO aggregators. With supportive procurement systems, *mandis* can enable direct transactions between women's groups and bulk buyers—reducing intermediaries and strengthening women's control over marketing.

E-markets and Digital Platforms: Opportunity with Conditions

Digital platforms and e-markets are expanding buyer reach and improving price transparency. India's electronic National Agriculture Market (e-NAM) integrates about 1,400 mandis, with nearly 18 million farmers and 253,000 traders registered. For women, e-markets can reduce the need to enter male-dominated spaces and enable direct electronic payments. Yet digital access can also create new exclusions. Participation assumes smartphones, connectivity, digital literacy, and control over accounts—resources many women lack or do not independently manage. Even when registered, usage is often mediated by male family members. E-markets also favour standardized, graded produce backed by reliable logistics, which small women producers may struggle to ensure alone. Evidence shows women benefit most when digital participation is routed through collectives—SHG federations, cooperatives, or women-led FPOs—that manage onboarding, quality compliance, and logistics. Technology works

best as a complement to collective institutions. E-markets become truly inclusive when digitisation happens through supported community platforms, not isolated individual effort.

Towards Integrated Pathways

Experience across India and other developing countries shows that no single institution can address women's market constraints on its own. SHGs build confidence and social capital; cooperatives and producer organisations provide scale and stability; mandis remain central to price formation; and e-markets expand reach and transparency. The challenge lies in integrating these pathways into a coherent ecosystem that works for women.

Strengthening women's market linkages is therefore not a peripheral concern. When women move from being price takers to informed negotiators and collective sellers, the gains extend beyond income—supporting more inclusive, resilient, and sustainable agri-food systems.

Women as Change Agents: From Mindset Transformation to Technology Adoption in Agriculture

Transforming agrifood systems is central to achieving food security, climate resilience, and inclusive economic growth. Across regions, women play a pivotal role in agricultural production, natural resource management, value addition, and household nutrition. Yet, structural inequalities continue to limit their access to productive resources, decision-making spaces, and technological innovations. Evidence from global and national research demonstrates that empowering women as agents of change—through mindset transformation, enabling institutions, and equitable access to technology—can significantly enhance agricultural productivity, resilience, and sustainability (FAO, 2011; World Bank, 2020b).

Mindset Transformation: Overcoming Historical Barriers and Recent Shifts

Historically, entrenched social norms, limited educational opportunities, and legal constraints have marginalized women in agriculture, confining them to subsistence roles and restricting their access to land, credit, and extension services. The FAO's 2011 report, "The State of Food and Agriculture: Women in Agriculture—Closing the Gender Gap for Development," highlights that women receive only a fraction of the productive resources compared to men, resulting in significant productivity losses globally (FAO, 2011). However, recent decades have witnessed a gradual shift in both policy and societal attitudes, driven by evidence-based advocacy and grassroots mobilization. Studies from the International Food Policy Research Institute (IFPRI) and national agricultural universities demonstrate that empowering women with knowledge, leadership training, and community-based platforms lead to enhanced agency, innovation, and resilience in rural communities (IFPRI, 2019).

Global campaigns such as the UN Women's "Empower Women, Empower Humanity" initiative and the World Bank's Gender Strategy (2023–2030) have further catalyzed mindset shifts at structural and individual levels, emphasizing the importance of gender-responsive policies, legal reforms, and inclusive extension models. These interventions have yielded measurable improvements in women's participation in cooperative governance, value chain development, and agribusiness entrepreneurship UN Women, 2020).

At the individual level, evidence from ICAR-led studies in India shows that targeted capacity-building enhances women farmers' confidence, scientific orientation, and willingness to experiment with improved practices—key determinants of technology adoption. Similar findings from Africa indicate that women participating in farmer field schools and peer learning platforms demonstrate higher uptake of climate-resilient practices.

At the household and community level, mindset change is often catalyzed by visible economic outcomes. FAO field evidence documents instances where women's adoption of improved rice cultivation practices resulted in higher yields, subsequently reshaping household decision-making dynamics and community perceptions of women's expertise (FAO, 2018). In eastern India, women adopting System of Rice Intensification (SRI) practices gained greater recognition as farmers and decision-makers once productivity gains became evident (World Bank, 2020a).

Institutional and Policy Environments

Institutional attitudes significantly influence women's access to agricultural innovations. Historically, extension systems have been designed around male farmers, limiting women's exposure to information and technologies. FAO and World Bank analyses demonstrate that gender-responsive

extension services—including women facilitators, decentralized delivery, and flexible training schedules—substantially improve outreach and adoption among women farmers (FAO, 2017).

The Women's Empowerment in Agriculture Index (WEAI) provides empirical evidence linking women's decision-making power, leadership, and control over income with improved agricultural outcomes and technology uptake (IFPRI, 2019). These findings underscore the importance of embedding gender metrics within agricultural policy frameworks and investment decisions.

Technology Adoption: Access, Barriers, and Impact

The adoption of innovative technologies—from climate-smart agriculture to digital financial services—has emerged as a powerful enabler for women's empowerment and agricultural transformation. Despite this, the 2022 FAO report on "Digital Agriculture and Rural Women" underscores persistent gender gaps in access to digital tools, mechanization, and information networks, especially in low- and middle-income countries (FAO, 2022). Barriers include affordability, digital literacy, socio-cultural norms, and inadequate infrastructure.

Case studies from the African Union and the Indian Council of Agricultural Research (ICAR) reveal that women-led Farmer Producer Organizations (FPOs) and cooperatives have successfully piloted technology adoption programs, increasing yields, reducing labor burdens, and improving market access. For instance, interventions such as mobile-based advisory services in Kenya and e-market platforms in India have demonstrated significant gains in women's income, household nutrition, and resilience to climate shocks (African Union, 2020; ICAR, 2021).

Moreover, research by the International Food Policy Research Institute (IFPRI) finds that when women are included in the design and dissemination of new technologies, adoption rates and impacts on community well-being are significantly higher (IFPRI, 2020). These findings underscore the need for participatory approaches and gender-sensitive innovation ecosystems.

Evidence from Uttar Pradesh and Bihar indicates that dissemination of improved seeds through women's self-help groups and women-led Farmer Producer Organizations (FPOs) significantly increases adoption rates compared to conventional extension approaches. Peer learning, trust-based engagement, and collective problem-solving emerged as key enablers (CABI Agriculture & Food Security, 2024).

Role of the Private Sector in Advancing Women's Empowerment

UN Women, FAO, and the World Bank recognize the private sector as a critical partner in scaling women's access to technology, markets, and services, particularly where public systems face capacity constraints (UN Women, 2020).

Private organizations are increasingly recognized as key partners in scaling women's empowerment and technology adoption in agriculture. Agribusiness firms, technology companies, and impact investors have launched initiatives targeting women farmers, entrepreneurs, and cooperatives. For example, Mastercard's "Farm Pass" platform and Corteva Agriscience's "2 Million Women in Agriculture" program provide digital solutions, financial services, and mentorship tailored to women's needs (Mastercard, 2022; Corteva, 2024).

Public-private partnerships, such as those facilitated by the Alliance for a Green Revolution in Africa (AGRA) and the Global Alliance for Improved Nutrition (GAIN), have demonstrated the effectiveness of leveraging private sector innovation, investment, and distribution networks to reach underserved women farmers. However, research from the World Bank and FAO emphasizes the need for robust regulatory frameworks, accountability mechanisms, and gender-inclusive business models to ensure equitable outcomes (FAO, 2022).

Looking ahead, private organizations can play a transformative role by co-developing scalable technologies, fostering inclusive value chains, and supporting women's leadership in agri-tech entrepreneurship. Strategic alignment with national policies and global frameworks will be critical to maximizing impact and sustainability.

Strategies for Empowerment and Technology Scaling

- Strengthen Gender-Responsive Policies: Governments and development partners should adopt and implement policies that address structural barriers, promote secure land tenure, and ensure equal access to resources and services (FAO, 2021).
- Invest in Capacity Building: Expand training programs in digital literacy, leadership, and

financial management for women in rural areas, leveraging partnerships with universities, NGOs, and the private sector (CGIAR, 2022).

» Promote Inclusive Innovation: Support the co-creation of technologies and services with women farmers, integrating their knowledge and preferences into product design and dissemination strategies (IFPRI, 2020).

» Foster Public-Private Partnerships: Incentivize collaboration between governments, private companies, and civil society to scale gender-sensitive technologies, improve market access, and enhance value chain integration (AGRA, 2021).

» Enhance Data Collection and Accountability: Invest in gender-disaggregated data collection, monitoring, and evaluation to inform evidence-based policy and track progress toward gender equality goals (UN Women, 2020).

Women are central to the transformation of agri-food systems. When supported through mindset transformation, enabling institutions, equitable access to technology, and responsible private sector engagement, women emerge as powerful agents of change. Aligning agricultural policies, investments, and partnerships with gender-transformative and evidence-based approaches is essential for achieving sustainable, inclusive, and resilient food systems in line with global development goals.

Women Innovators and Agri-Food Tech Leaders: Policy Pathways from India and the World

Agri-food systems globally are under unprecedented stress due to climate change, demographic pressures, resource degradation, and rising nutrition insecurity. Technological innovation—ranging from digital agriculture and precision farming to food processing and alternative proteins—has become central to addressing these challenges. However, innovation ecosystems in agri-food systems remain deeply gendered. While women constitute nearly 43 percent of the global agricultural workforce, they are significantly under-represented as innovators, technology developers, startup founders, and decision-makers in agri-food technology (FAO, 2011; World Bank, 2020).

Emerging evidence suggests that women innovators bring distinct perspectives to agri-food technology, prioritizing inclusivity, sustainability, nutrition outcomes, and community-level adoption (Doss *et al.*, 2018). Recognizing and scaling women's leadership in agri-food technology is therefore not only a gender equity imperative but also a strategic policy intervention for resilient and sustainable food systems.

Women's Leadership in Global Agri-Food Technology

Across regions, women innovators are advancing transformative agri-food solutions. In high-income countries, they are active in food biotechnology, alternative proteins, sustainable packaging, and circular bioeconomy models—addressing emissions, waste, and resource use (OECD, 2021). In low- and middle-income countries, women are driving digital agriculture and climate-smart solutions. Women-led mobile advisories, weather platforms, and digital marketplaces expand information access, lower transaction costs, and boost smallholder participation—often with higher uptake among women due to gender-sensitive design. In Africa, Latin America, and Southeast Asia, women-led cooperatives and social enterprises combine technology with collective action in crops like coffee, cocoa, fisheries, and horticulture, integrating traceability and certification to access higher-value markets.

Women's Role in Innovation Systems

Innovation succeeds for women only when it addresses their specific constraints. Historically excluded from shaping research and technology agendas, women need stronger voice in setting priorities. Their growing role in post-harvest management, processing, and marketing—linking production to nutrition and income—demands inclusive innovation. In dairying, for instance, investments in cooling, storage, and value addition (yoghurt, ghee, cheese) must recognise women as central actors. Agriculture must be viewed holistically—connecting women's roles in farming, household nutrition, income use, and children's education. With changing rural–urban dynamics and migration patterns, women's systematic involvement in knowledge and innovation systems is essential so technologies reflect their realities. Gender-responsive agriculture, nutrition, and health programmes must make women both creators and beneficiaries of policy and investment (Kokate *et al.*, 2012). Yet access to new technologies and markets remains uneven, varying across regions and socio-

cultural contexts. Addressing these structural barriers is key to unlocking women-led agricultural growth.

Indian Context: Women Innovators in Agri-Food Tech

India has the 3rd largest ecosystem in terms of Startups in the world, contrary to the 10% figure of women ownership, more recent data indicates that over 45 per cent of recognized startups have at least one woman director (PIB, 2025). Also, research shows that ventures started by women are more sustainable in nature. According to Grant Thornton Bharat's latest survey among 250 Indian companies revealed that the share of women in the Chief Executive Officer or Managing Director roles has increased by 55 per cent while global average stands at 24 per cent, which reflected significant growth in their role in driving the economy.

India represents a paradoxical landscape. Women contribute between 60–75 per cent of agricultural labour in several regions, yet their access to land ownership, formal credit, and technology remains limited (Agarwal, 2018). Despite these constraints, Indian women innovators are increasingly shaping agri-food technology ecosystems.

Women leaders have been particularly influential in sustainable agriculture, biodiversity conservation, and agroecology, integrating traditional knowledge with scientific innovation. At the enterprise level, women-led agri-tech startups have introduced digital platforms for input delivery, price discovery, cold-chain logistics, and farmer–consumer linkages. These innovations are critical in reducing post-harvest losses and enhancing farmer incomes, especially for small and marginal producers.

Women's collectives and producer organizations have emerged as important innovation intermediaries. In dairy, millets, fisheries, and food processing, women-managed enterprises have adopted improved processing technologies, food safety standards, and value-addition techniques. Evidence suggests that such enterprises generate strong spillover effects in terms of household nutrition, women's employment, and local economic resilience (NITI Aayog, 2021).

More recently, women professionals and entrepreneurs in India are engaging with advanced technologies such as artificial intelligence, remote sensing, and Internet of Things (IoT) applications for soil health monitoring, water management, and climate risk assessment. While still limited in scale, these initiatives demonstrate the potential for women to participate in frontier agri-food innovation when enabling ecosystems are in place.

Distinctive Features of Women-Led Agri-Food Innovations

Analysis across contexts reveals the following distinctive features of women-led agri-food technology initiatives:

- **Inclusive design and accessibility:** Women innovators emphasize affordability, ease of use, and contextual adaptation, which are critical for smallholder adoption.
- **Nutrition-sensitive approaches:** Innovations frequently integrate production with dietary diversity, food safety, and household nutrition outcomes.
- **Climate and sustainability orientation:** Women-led initiatives show strong alignment with climate-smart agriculture, low-input systems, and circular economy principles.
- **Collective and institutional innovation:** Women leaders often work through cooperatives, SHGs and producer organizations, combining technological and institutional change.

These characteristics align closely with policy objectives related to sustainable development, climate resilience, and inclusive growth.

Despite their contributions, women agri-food tech leaders face systemic constraints. Access to growth capital remains a major challenge, with women-led agri-tech startups receiving a disproportionately small share of venture and private equity funding (World Economic Forum, 2022). Gender bias in innovation networks, limited mentorship, and weak integration into mainstream technology ecosystems further restrict scaling.

In India and other developing economies, structural issues such as insecure land rights, digital divides, time poverty, and mobility constraints disproportionately affect women innovators. Policy frameworks often adopt gender-neutral approaches to innovation, overlooking the differentiated barriers faced by women.

To unlock the full potential of women innovators in agri-food technology, Rathore *et. al.* (2025) recommends the following policy actions:

1. Gender-responsive innovation policy: Governments should embed gender criteria in

agri-tech missions, startup policies, and national innovation strategies.
2. Targeted financing mechanisms: Expand gender-smart financing, blended finance instruments, and dedicated funds for women-led agri-food enterprises.
3. Strengthening incubators and accelerators: Support women-focused agri-tech incubators, particularly in rural and semi-urban regions.
4. Capacity building and STEM pathways: Promote women's participation in agri-food STEM education, research leadership, and digital skill development.
5. Leveraging collective institutions: Integrate women's collectives, FPOs, and cooperatives into technology deployment and scaling strategies.
6. Data and accountability: Systematically collect sex-disaggregated data on agri-food innovation, entrepreneurship, and technology adoption.

Women innovators and agri-food tech leaders are central to the transformation of global and Indian food systems. They demonstrate that technological progress can be aligned with equity, sustainability, and local relevance. A policy shift toward gender-responsive innovation ecosystems is essential to scale these contributions. Investing in women's leadership in agri-food technology is not only a matter of justice but a strategic pathway toward resilient, inclusive, and sustainable food systems.

Women in Policy and Planning: Bridging the Gap in Governance

Social equity, and hence, gender-parity, is one of the five pillars (soil health management, water conservation, biodiversity conservation, energy efficiency, and social equity) of Sustainable Agriculture. As in most agrarian and developing economies, Indian agriculture is seeing a growing feminization of agriculture with women making close to half of the agricultural workforce both in production and post-production activities, with rising competence of rural women and male outmigration and involvement in non-farm occupation as the primary factors. Yet, the contribution of women remains largely unrecognized in policy decisions and undercounted in data. Commemorating the 75 years of Independence, NITI Aayog envisaged Empowered women for Empowering Nation and positioning India as a progressive nation (Patel and Sethi, NITI Aayog, 2022) and several government flagship schemes and programmes are initiated to empower rural women by creating livelihood opportunities and paid employments. Still there are only a few women leaders at the top of the pyramid in any sphere of the agrifood system.

Women's participation in food system governance—from national policy to farm-level decisions—has long been limited. With little control over land, many women struggle to access schemes meant for them; for example, their share in the *Pradhan Mantri Fasal Bima* Yojana was only 16 per cent in *Rabi* 2024. (Banerjee, 2025; https://www.orfonline.org/expert-speak/closing-the-knowledge-gap-for-women-in-agriculture).

Yet when given space, women have demonstrated strong leadership—from *Panchayats* to ministerial roles. Institutional steps such as the Central Institute for Women in Agriculture (est. 1996), the Gender Resource Centre in the Ministry of Agriculture, mandatory women specialists in *Krishi Vigyan Kendras* and the *Mahila Kisan Sashaktikaran Pariyojana* under *Deendayal Antyodaya Yojana* – National Rural Livelihoods Mission have aimed to strengthen women's skills, leadership, and access to resources. India also designated 15 October as Women Farmers' Day in 2016. Despite incremental gains, women remain underrepresented in higher decision-making roles. Structural reforms are needed to ensure their meaningful inclusion in agrifood governance.

Women are central to natural resource management—land, water, forests, and biodiversity—yet often lack access to modern technologies. Scaling women-friendly interventions (watershed development, water harvesting, agroforestry, green energy) and initiatives like *Jal Sakhis* and *Pani Panchayats* can ease drudgery and boost incomes. Blending women's traditional knowledge with scientific innovation is vital for climate resilience and nutrition security.

A clear policy mandating women's representation at all levels of agrifood governance—national and global—is essential for inclusive and sustainable transformation.

Way Forward

Women play a vital role in a most of the agriculture and food system activities, thus contributing to a

sustainable agricultural development pathway. To achieve inclusive agricultural growth, it is, therefore necessary to empower women, address issues relating to drudgery of women and their health and nutritional status and minimize gender disparity. These can effectively be addressed through gender-friendly technology assessment, refinement and extension methodologies to improve women's access to technology. The FAO has estimated that if women farmers had the same access to resources as men, agricultural output in 34 developing countries would have risen by an estimated average of up to 4%. This would have reduced the number of undernourished people in those countries by as much as 17%, translating to 150 million fewer hungry people. Thus, investments in women and overcoming their drudgery are perhaps the best actions for future development. The evidence is clear that when women farmers have the opportunity to earn and control the home income, they are more likely to spend on their children's nutrition, education and health. Improving the knowledge and status of women would, therefore, deliver significant outcomes in terms of agricultural production, food security, child nutrition and health and education, thus contributing significantly towards SDGs.

Achieving gender-equitable agrifood systems requires coordinated action across multiple domains enumerated below:

- **Policy and legal reforms:** Governments must ensure gender-equitable land rights, inheritance laws, and access to productive resources. Secure land tenure also increases investment in soil conservation, productivity, and food security. Therefore, gender integration must be explicit in agriculture, food security, and climate policies.
- **Gender responsive institutions and services:** Agricultural research, extension, and innovation systems must be redesigned to reach women effectively. Only 5 percent of extension services target women farmers (World Bank, 2019). Recruiting women extension agents and tailoring services to women's needs can significantly enhance impact.
- **Investment in capacity and leadership:** Women leadership development, mentorship, and networking are essential. Evidence from quota systems shows that women's representation leads to more inclusive investments in water, nutrition, and education (Chattopadhyay & Duflo, 2004).
- **Reducing time burdens:** Investments in clean energy, water access, childcare, and labour-saving technologies can reduce burden of unpaid work. Access to basic infrastructure can free up to four hours per day for women (World Bank, 2019).
- **Inclusive markets and finance:** Women-centred financial products, digital platforms, and market linkages enable women to scale enterprises. Digital financial inclusion alone could raise women's incomes by up to 30 percent (GSMA, 2020).

To achieve the desired goals and targets, urgent actions are called for at the national, regional and international levels on the following:

- Collective advocacy to raise awareness of women's needs in agriculture and to ensure recognize their valuable contribution towards agricultural development.
- Improvement of education opportunities and awareness of women o make their own choices for better farming options and for responding to new opportunities for diversified agriculture and better living.
- Enhancement of women's abilities to actively participate in the development processes and offer them opportunities with greater social responsibility.
- Promotion of collective action and leadership among women to develop programmes that directly address women's needs and make agricultural support systems gender-sensitive.
- Reducing drudgery for farm women by ensuring access to new tools and implements that increase efficiency and higher productivity. Also, the Agricultural Research and Innovation for Development (ARI4D agenda needs to be made gender-sensitive and pro-women.
- Address gender disparity through appropriate policies, legislation, enforcement mechanisms and establishing women's rights (e.g. access to markets, ownership of land etc.).
- Promote women's ownership and control of resources (e.g. land, bank accounts, farm implements) through institutional mechanisms and necessary legal support.
- Invest in women's human capital through education and training for skill development, which are critical for women to exploit their abilities, utilize their time and energy and realize their full potential.

We now need a vibrant platform which can move from discussions to action-oriented implementation, serving as a space to showcase success stories, exchange best practices, and launch progressive policy frameworks. At the grassroots level, targeted training and mentorship programs for rural women can nurture a pipeline of future leaders, with women-led cooperatives and self-help groups strengthening collective bargaining power and ensuring that progress reaches even the most marginalized communities. Meaningful collaborations between key stakeholders can help build sustainable support networks, while public–private partnerships can accelerate transformation through combined technical expertise and funding. Empowering women isn't just about equity, but a catalyst for food security, economic growth, and climate resilience. The year 2026 must mark the transition from rhetoric to results.

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Abstract/Extended Summary of Plenary/ Keynote/Lead Lectures during Technical Sessions

Women in Indian Agriculture: From Participation to Systemic Leadership

M.L. Jat
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Agriculture and Women's Role

Agriculture is not merely an economic activity; it is a foundation of human civilization. The story of agriculture is incomplete without recognizing the role of women in sustaining farming systems across generations. Across societies, women have long contributed to the production, processing, and stewardship of food—roles often under-recognized in formal economic narratives. Historical scholarship and anthropological evidence suggest that women were among the earliest managers of household food systems, gathering wild foods, identifying edible plants, and preserving seeds. These early practices contributed to the domestication of crops and the evolution of farming systems that supported stable food supplies and community nutrition.

In India, this relationship is reflected in rural livelihoods and cultural memory. The imagery of ***Annapurna***—the provider of nourishment—symbolizes the deep connection between women and food systems. From ensuring household food security to managing livestock and conserving agro-biodiversity, women have historically safeguarded traditional food crops, kitchen gardens, and indigenous livestock practices that support dietary diversity and community resilience. Their knowledge of food preparation, storage, and seasonal nutrition has been central to maintaining intergenerational food traditions.

Today, the significance of this role is increasingly recognized in policy and development discourse. As agri-food systems confront climate change, nutritional security, and rural transformation, strengthening women's access to knowledge, technology, institutions, and markets has become vital for building resilient and inclusive agricultural systems. Recognizing the historical contributions of women provides a foundation for designing policies and innovation systems that build on this legacy of knowledge and stewardship, enabling women to shape the future of agriculture.

Historical Continuity of Women in Agriculture

Women's role in agriculture has deep historical roots. Anthropological evidence highlights their knowledge of plant gathering, seed selection, and cultivation practices as central to early crop domestication and the emergence of settled agriculture. In many early societies, women's understanding of local ecosystems, seasonal cycles, and plant diversity contributed significantly to sustainable farming systems and community nutrition.

Ancient Indian literature also reflects women's engagement in agrarian life. During the Vedic period, agricultural fertility and food production were symbolically linked with feminine power. The Sanskrit term ***duhitr***, often translated as "daughter," literally refers to one who milks cows, highlighting young women's role in dairy activities. Cultural traditions, including agricultural festivals, recognized women's contributions to both production and the celebration of abundance, linking agricultural work with community life.

Classical texts such as Kautilya's *Arthashastra* acknowledge women as cultivators, agricultural labourers, and tenants, managing food stocks, seed reserves, and livestock products. These historical references underline the enduring role of women in linking agricultural production with nutrition security, biodiversity conservation, and the transmission of food-related knowledge.

Women and the Transformation of Rural Economies

In recent decades, the structure of Indian agriculture has undergone significant changes that have brought women's role into sharper focus. Migration of male labour from rural areas, the predominance of smallholder farming, and the growing importance of livestock and allied activities have contributed to what is often described as the feminization of agriculture, with women assuming

greater responsibility in farm management and household-level decision-making- a continuation of tradition of ***Shram Shakti***.

Women's collective participation in rural institutions has also expanded significantly. The Self-Help Group (SHG) movement, linking more than 100 million women across India, represents one of the largest grassroots networks of women in the world. These groups have improved access to credit, facilitated livelihood diversification, and strengthened women's participation in local economic activities. Such collective efforts resonate with the long-standing Indian ethos of ***sahakarya*** (cooperation) and community stewardship in rural life.

Women-led Farmer Producer Organizations (FPOs) and cooperatives are emerging as important platforms for strengthening market participation and value addition. Across sectors such as dairy, food processing, and small-scale agri-enterprises, women entrepreneurs are increasingly contributing to rural economic growth. These initiatives echo the traditional recognition of women as custodians of ***dhanya*** (grain and abundance) within household and community economies.

Recent initiatives such as ***Drone Didi***, ***Lakhpati Didi***, and women-led water user associations further illustrate the expanding scope of women's engagement in technological innovation, resource management, and community leadership within agriculture. They represent a contemporary expression of ***Nari Shakti*** shaping the future of rural development and agricultural transformation.

Together, these developments point to an important shift: women are increasingly shaping the evolving structure of rural economies and agri-food systems. In this evolving landscape, women farmers continue the legacy of the traditional ***Annadata***, sustaining both livelihoods and nutrition security for society.

Institutional Response: The Role of ICAR

As the apex body of India's agricultural research and education system, the Indian Council of Agricultural Research (ICAR) has progressively integrated gender perspectives into research, education, and extension programmes. Through its network of research institutes, agricultural universities, and extension centres, ICAR plays a central role in shaping the country's agricultural innovation system and ensuring that scientific advances reach farmers, including women farmers. This effort aligns with the broader vision of strengthening women as knowledge partners within India's agri-innovation ecosystem.

Establishment of the ICAR-Central Institute for Women in Agriculture (CIWA) in 1996, marked a milestone in understanding gender roles in agriculture and developing strategies to strengthen women's participation in agricultural development. Research within the ICAR system has contributed to identifying technological and institutional innovations that enhance women's productivity, reduce drudgery and recognise women's long-standing experiential knowledge in farming and food systems—knowledge often transmitted across generations within rural communities.

Progress is also visible in the development of women-friendly agricultural tools and technologies, including improved farm implements and mechanisation options designed to ease labour-intensive operations such as transplanting, weeding, harvesting, and post-harvest processing. These innovations contribute to transforming traditional ***shrama*** (labour) into more efficient and dignified agricultural work for women farmers.

The ICAR system further supports a vast research, education and extension network through 113 research institutions, 80 agricultural universities and 731 Krishi Vigyan Kendras (KVKs) across the country. Through training programmes, demonstrations, and field-level capacity building, value chain development, entrepreneurships etc this institutional landscape increasingly engage with women farmers and women-led community resource persons. In several states, women extension workers such as ***Krishi Sakhis*** and ***Pashu Sakhis***, promoted under Government of India and state livelihood initiatives, are trained through KVKs to disseminate improved agricultural and livestock practices within rural communities. These grassroots knowledge networks reflect the spirit of ***Vasudhaiva Kutumbakam***, where shared knowledge strengthens the collective resilience of farming communities.

Equally notable is the growing presence of women within the agricultural knowledge system. Female participation in agricultural education has risen sharply over the past decade. In 2023–24, women constituted about 46 percent of undergraduate students, nearly 49.5 percent at the postgraduate level, and over 53 percent of PhD scholars in agricultural universities—an increase from less than one-fourth of enrolment in the mid-2000s. This growing participation signals the emergence of a

new generation of women scholars and innovators in agriculture.

A similar trend is visible in the Agricultural Research Service (ARS), where the share of women scientists has increased from about 7.9 percent in 2006–07 to over 41 percent in 2023–24. This growing presence reflects the expanding role of women not only as farmers and entrepreneurs but also as scientists and leaders within agricultural innovation systems. In many ways, it reflects the unfolding of *Shakti* within India's scientific and agricultural institutions.

For further mainstreaming the role of women in agri-food system, ICAR Gender Strategy for National Agricultural Research, Education and Extension System (ICAR Gender Strategy DKMA Oct 7- Revised-CIWA-1.pdf) was launched in 2025. Also, Government of India have launched several programs and schemes for supporting women in agri-food system having larger impact at scale. These initiatives reinforce the national commitment to empowering women as central actors in sustainable and nutrition-sensitive agriculture.

Towards a Gender-Responsive Agricultural Innovation System

Looking ahead, strengthening women's leadership in agriculture will require a fundamental shift in the design of agricultural innovation systems. Technologies must reduce drudgery while improving productivity; extension systems must reach women farmers directly through digital and community-based platforms; and farmer institutions and value chains must enable women to participate as entrepreneurs and leaders. At the same time, agricultural education and research systems must nurture a new generation of women scientists, innovators, and professionals. Women farmers also play a critical role in conserving agro-biodiversity, sustaining local and underutilised food systems, and advancing regenerative and conservation-oriented farming practices that are increasingly important in the context of climate change reflecting the long-standing cultural ethos of harmony between *prakriti* (nature) and agricultural livelihoods.

Advancing this transformation requires a clear strategic focus—strengthening women's leadership in agricultural institutions, expanding opportunities for women-led enterprises across agri-value chains, and embedding gender perspectives across research, extension and policy systems. ICAR and other organizations have an important role in enabling this shift by generating knowledge, building capacities and supporting innovation systems that strengthen women's agency across agri-food systems. Such a transition will be central to building resilient, inclusive and sustainable agri-food systems in the decades ahead. In this journey, empowering women farmers remains integral to sustaining the spirit of ***Annadata*** and ensuring long-term food and nutrition security for society.

Empowering Women Farmers: ICAR's Vision for Inclusive Agri-Food Systems

Rajbir Singh[1], R Roy Burman[2] and Arvind Kumar[3]

[1]Deputy Director General (Agricultural Extension), [2]Assistant Director General (Agricultural Extension) and [3]Principal Scientist (Agricultural Extension), Indian Council of Agricultural Research, New Delhi

Introduction

Agriculture remains a primary source of livelihood for millions of rural households in India and across the developing world. Women constitute nearly half of India's population and make substantial contributions to agricultural production and rural livelihoods. They play indispensable roles in agri-food systems as farmers, labourers, entrepreneurs, and managers of natural resources, contributing significantly to food production, household nutrition, and rural livelihoods. According to the Periodic Labour Force Survey (PLFS) 2023–24, agriculture continues to be a major source of rural livelihoods, with about 59.8% of rural households depending on agriculture and allied activities. The survey also highlights the prominent role of women in the sector, with 76.9% of rural female workers engaged in agriculture compared with 49.4% of rural male workers, indicating a greater dependence of rural women on agriculture for employment and income. They participate actively in crop cultivation, horticulture, livestock rearing, fisheries, and post-harvest operations, while also preserving indigenous knowledge and promoting sustainable resource management. Despite their substantial contributions, women often face constraints such as limited access to land, credit, technology, extension services, and markets, which restrict their productivity and decision-making power. Strengthening women's access to knowledge, skills, and institutional support can enhance farm productivity, improve household nutrition, and promote inclusive and sustainable agricultural development. Empowering women in agri-food systems is therefore essential for achieving food security, poverty reduction, and resilient rural economies.

Women's Issues in Agriculture

Despite their significant role, women in agriculture face multiple structural, economic, and socio-cultural challenges that limit their productivity and empowerment. Limited access to land ownership, credit, quality inputs, modern technologies, extension services, and markets restricts their ability to adopt improved practices and enhance incomes. Women frequently perform labour-intensive and drudgery-prone tasks with inadequate access to women-friendly tools and mechanization, resulting in heavy workloads and occupational health risks. Wage disparities, limited participation in decision-making, restricted mobility, and low digital literacy further constrain their opportunities. In addition, socio-cultural norms and the burden of unpaid household responsibilities reduce the time available for skill development and entrepreneurship. Addressing these challenges through gender-responsive policies and institutional support is essential for improving women's productivity, livelihoods, and overall well-being in agriculture.

Recognizing the vital role of women in agriculture, the Indian Council of Agricultural Research (ICAR) and the Government of India have prioritized gender equity through targeted interventions. These include women-friendly tools and technologies to reduce drudgery, capacity-building programmes, improved access to credit and markets, and support for women-led Farmer Producer Organizations and agri-entrepreneurship. The ICAR has also outline its strategy in the document on ICAR Gender Strategy for the National Agricultural Research, Education and Extension System aims to promote equal opportunities for women and strengthen their role in building resilient and sustainable agri-food systems.

ICAR's Commitment to Women's Empowerment

ICAR has consistently recognized women as key agents of agricultural innovation and rural transformation. Over the decades, the Council has integrated gender perspectives into agricultural research, education, and extension. Through its nationwide network of institutes and the Krishi Vigyan Kendras (KVKs), ICAR has strengthened the capacities of rural women by providing skill-oriented training, technology demonstrations, and entrepreneurship development programmes. These

efforts have enabled women to enhance productivity, adopt improved technologies, and participate more effectively in value chains.

Gender-Responsive Research and Technological Innovations

Recognizing the multidimensional role of women in agriculture, ICAR has promoted gender-responsive research aimed at reducing drudgery and improving efficiency. Farm tools and equipment designed specifically for women have helped reduce physical strain and improve safety. Improved varieties of crops suitable for smallholders, backyard livestock technologies, integrated farming systems, and nutrition-sensitive agriculture have enhanced both livelihoods and household food security. Such innovations reflect ICAR's commitment to inclusive agricultural development.

Capacity Building and Skill Development

Capacity building remains central to ICAR's strategy for women's empowerment. Through training programmes, vocational courses, and participatory extension approaches, rural women are being equipped with the knowledge and skills required for modern agriculture. Special emphasis has been placed on strengthening women-led enterprises in seed production, mushroom cultivation, beekeeping, dairy, poultry, and value addition. These initiatives not only enhance income opportunities but also strengthen women's leadership within rural communities.

Women's Entrepreneurship and Institutional Support

ICAR has also played a pioneering role in promoting women's collectives and entrepreneurship. Support for self-help groups, farmer producer organizations, and women-led agri-enterprises has enabled rural women to access markets and improve bargaining power. By facilitating linkages with financial institutions, input suppliers, and marketing channels, ICAR has contributed to building sustainable rural enterprises led by women.

Digital Inclusion and Extension Innovations

In recent years, ICAR has embraced digital technologies to expand the reach and effectiveness of extension services. Mobile-based advisories, digital learning platforms, and decision-support tools are enabling women farmers to access timely information and improve farm management. Efforts are also underway to ensure that digital innovations are accessible and user-friendly for women farmers, particularly those in remote areas.

Alignment with National and Global Priorities

ICAR's initiatives are aligned with national and global priorities for inclusive agricultural development. The Council works in close collaboration with the Ministry of Agriculture and Farmers Welfare and state governments to implement programmes that promote gender equality and rural livelihoods. ICAR's efforts also contribute to global commitments such as the United Nations Sustainable Development Goals, particularly those related to poverty reduction, food security, gender equality, and sustainable agriculture.

Women's Empowerment for Sustainable Agricultural Growth

ICAR believes that empowering women is not only a matter of social justice but also a prerequisite for sustainable agricultural growth. Evidence from across regions demonstrates that investments in women farmers lead to higher productivity, improved nutrition, and stronger rural economies. Women's participation in decision-making enhances the effectiveness and sustainability of agricultural interventions.

Future Vision for Women-Led Agricultural Transformation

Looking ahead, ICAR envisions a future in which women are recognized not merely as contributors but as leaders of agricultural transformation. Strengthening women's access to knowledge, technology, institutions, and markets will remain a priority. Greater emphasis will be placed on youth engagement, climate-resilient agriculture, digital inclusion, and value-chain development to ensure that women benefit from emerging opportunities in the agri-food sector.

GCWAS-2026: A Collective Commitment

GCWAS-2026 symbolizes a collective commitment to building inclusive agri-food systems where women can realize their full potential. The Conference brings

together policymakers, scientists, development practitioners, entrepreneurs, and farmers from across the world to shape a shared vision for the future.

As ICAR joins the global community in this important initiative, it reaffirms its commitment to advancing science-led, gender-responsive agricultural development. The Council remains dedicated to working with national and international partners to ensure that women farmers and agri-entrepreneurs become central actors in the transformation of agri-food systems.

Gender-Responsive Agricultural Research & Extension: Pathways for Equity and Equality

Mridula Devi
ICAR-CIWA, Bhubaneswar, India
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Women constitute significant share of India's agricultural workforce and play a pivotal role in agri-food system including crop production, livestock, fisheries, post-harvest management, and household nutrition. According to the Periodic Labour Force Survey (PLFS) 2023-24, 44.4% of rural households depend on agriculture where 76.9% of rural female workers are engaged in agriculture, compared with 59.8% of rural male workers. Recent findings indicated that women's participation either independently or jointly among rural agricultural households' averages 59.28% in crop production (16 surveyed states), 72.2% in horticulture (14 states), 68.34% in dairy (12 states), 67.33% in poultry (8 states), 75.52% in fisheries (8 states), 74.4% in forestry (8 states) and 69.2% in post-harvest activities (16 states) which signifies the active involvement of women in all sectors of agriculture (ICAR-CIWA study 2025).

Despite active involvement of women in major agriculture and allied activities, there exist persistent gender gaps in access to resources, technologies, information, institutional support, and decision-making, etc. which constrain productivity, sustainability, and their overall empowerment. Gender-neutral approaches mask structural inequalities and uniform interventions fail to reflect gender-differentiated roles and constraints in agriculture, negatively affecting their efficiency and effectiveness in agri-food system and livelihood of farm families. Recognizing these, ICAR-CIWA has made significant effort in generating evidences, developing women-centric and gender-responsive technologies, designing transformative research and equity-focused extension models, and strengthening grassroot institutional capabilities to support all the stakeholders. The achievements confirm that bringing gender equity across the agricultural innovation system enhances technology adoption, reduces drudgery, strengthens institutional responsiveness, promotes equality in participation and decision making, thereby contributes to women's empowerment.

Strengthening the institutional ecosystem for gender mainstreaming within National Agricultural Research Extension and Education System (NAREES) is the need of the hour to systematically address long standing gender gaps, enhance the relevance and effectiveness of research, education and extension for inclusive, equitable and sustainable agri-food systems. The conceptualization and development of the ICAR Gender Strategy along with Gender Framework for 'Krishika Shakti' and Sustainable Agri-food System (GF-Krissa) and Gender Framework for Sustainable Agri-food System and Empowerment of Women in Agriculture (GF-SAEWA) are the strategic efforts in this direction. In line with the Gender Strategy, Framework for Strengthening Gender-Responsive Agricultural Research and Extension through Nodal Officers in NAREES, has also been developed by ICAR-CIWA to ensure gender equity in agriculture.

Gender-disaggregated data in agriculture are not readily available and the existing information remains scattered across multiple departments and sources, there is a need to integrate data from diverse sources to support evidence-based policy, planning, monitoring, and gender-responsive interventions. The development of National Information System for Women in Agriculture (NISWA) portal is another milestone, which serves as a national repository of gender responsive (GR) technologies/ package of practices (PoPs), GR-methodologies, schemes for women farmers, gender factsheet of institutions, women innovators, gender disaggregated data on participation and time contribution from secondary and primary sources and related resources. This online database aims to strengthen policy advocacy, programme design, and monitoring, enabling NAREES organizations to move from subjective gender inclusion to data-driven gender responsive research and extension.

Technologies are generally developed often overlooking the specific gender preferences, needs, and constraints in agricultural activities. As a result, women farmers frequently face barriers in accessing, adopting, and benefiting from these technologies, which limit overall development of society. A core achievement of ICAR-CIWA lies in advancing gender-

transformative research approaches that go beyond addressing practical needs to challenge structural constraints faced by women in agriculture. Through participatory research prioritization, co-design, testing, and refinement, the Institute has validated that women farmers are not passive recipients but active contributors to agricultural innovations. ICAR-CIWA has developed and validated a wide range of women-friendly tools, implements, and machines aimed at reducing drudgery, improving efficiency, enhancing safety, and increasing productivity across agricultural operations. Key innovations include pedal operated women-friendly coconut dehusker, power-operated groundnut stripper-cum-decorticator, improved manual disc ridger, easy harvester bag, women-friendly nursery tools, women friendly integrated vertical nutri-farming system for vegetable production with mushroom and poultry, women friendly rotary goat feeding system, ergonomic refined fish descaler, head-load management device, etc. Additionally, process of fermented fish silage manure, azolla-based poultry feed, green fodder incorporated animal feed concentrate, and weed based bio-input had been developed to support low-input farming. A wide range of food based processes and value-added product formulations had also been developed for therapeutic purposes, along with plant based textile related process technologies and protective clothing designs, contributing to nutrition, health, drudgery reduction, and livelihood enhancement for farm women.

ICAR-CIWA has made significant contributions in developing and demonstrating gender-responsive extension models and methodologies, namely 'Gender Responsive Integrated Homestead Aqua-horticulture Model (GRIHA)', 'Gender Sensitive Agri-Nutri Farming System Model (GSAN)', 'Sustainable She-preneurship in Mushroom Cultivation Model (2S2M)', 'Gender-Sensitive Community-based Agripreneurship Model through Livestock and Fisheries Technologies (GCAM)', 'Gender Sensitive Village Level Para Extension Worker Model (VPEW)', 'Family Poultry Production Model for Nutrition and Income', 'Gender-Sensitive Model for Doubling Farmers' Income', 'Gender Responsive Climate Smart Agriculture Framework', 'Multi Agency Participatory Extension Model for Sustainable backyard poultry (MAPEM)', 'Gender-Sensitive Extension Model for addressing Livelihood, Nutrition and Entrepreneurship (GSEM)', and Gender Responsive Climate Smart Agriculture Framework', 'Multi-storey and intercropping horticulture models', Gender-Inclusive approaches for Community Mango Orchards', JANANI Nutri-Garden Model, etc. All these models are primarily focusing on equity, location specific but scalable and address intersectional constraints related to access, skills, time constraints, and social norms, addressing SDG 5 (Gender Equality) along with SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and well-being), and SDG 13 (Climate Action). Together, these models demonstrated how gender-responsive package of practices and extension approaches can strengthen livelihoods, improve household nutrition, build climate resilience, and contribute to inclusive and sustainable agri-food systems.

The Checklists for assessing gender responsiveness of agricultural technologies and methodology for Livestock Farmers Livelihood Vulnerability Index (LLVI) are tools to enable researchers, extension professionals, and planners to systematically assess gender gaps, identifying root causes and accordingly guide for technologies development, programme design and evaluation.

There are deep rooted gender gaps in access to farm tools and machinery, and most women farmers face financial constraints, which restricts their efficiency and increases drudgery and time constraints. To promote gender equity women farmer interest groups (WFIGs)/ producer collectives (WFPOs/ WFPCs) were formed to facilitate access to credit and subsidies and small-scale women-led custom hiring centres (CHCs) were conceptualized and established in needy villages and communities for better access to farm tools. These initiatives improved productivity, reduced labour burden, facilitated easy marketing, and created local employment and entrepreneurship opportunities for rural women in India.

All these R&D experiences specified that gender equity need to be positioned as core principle with gender-responsive planning, budgeting, implementation, monitoring, and documentation of research and extension milestones to contribute towards achieving gender equality and sustainability in agri-food systems.

TECHNICAL SESSION I:
INTERPHASE WITH GLOBAL WOMEN TRAILBLAZERS

Meet the Women Thought-Leaders and Change-Makers

Dr Purvi Mehta
Senior Advisor at the Global Center on Adaptation (GCA), New Delhi, India

Professional Accomplishments

Dr Purvi Mehta is an internationally recognized agriculture production, market interventions and technology professional with nearly 30 years of experience driving scalable, market-led Agri business interventions across India, S.E. Asia, Africa and North America. She brings a unique blend of scientific depth, public–private partnership expertise, and commercial acumen to advance technology interventions, market optimization and long-term value creation in agriculture and allied sectors.

Dr Mehta is an Indian citizen, born and raised in India. She holds academic credentials with formal education from M.S. University (India), Tokyo University (Japan) and North Carolina State University (USA), culminating in a PhD in Agricultural Biotechnology. Over the course of her career, she has lived and worked across North America, Africa, South Asia, and Southeast Asia, holding senior roles in international development and research institutions. Her technical expertise spanning agriculture, climate change and digital innovation - is complemented by deep networks across international finance institutions, multilateral agencies, policy organizations and private sector.

Dr Mehta has worked extensively at the intersection of agriculture innovation, supply chains, seed systems, farm mechanization, climate adaptation and digital agriculture, translating emerging technologies into viable models that improve productivity, strengthen market linkages and measurable returns on investment.

She has served on several international advisory boards and councils and has engaged extensively with governments and policy institutions worldwide. She has presented her work to government bodies and parliamentary forums in more than 22 countries. During her decade-long global leadership role (2014-2025) at the Gates Foundation, she helped with the foundation's agriculture programs and climate strategy. She has also held senior roles at USAID, International Livestock Research Institute (CGIAR), delivering large scale partnership programs that combined inclusivity with resilience and sustainability.

Currently, Dr Mehta serves on a number of boards and advisory panels including,

- Independent Director on board of Advanta- World's fourth largest seed company
- Board of World Food Prize
- Board of MIT (Boston)'s advisory panel on agriculture, food and technology applications.
- Independent Director on Board of Deepak Fertilizers and Petrochemical Ltd.
- Co-Chair of Govt. of India's Environment Audit Council
- Board of M.S. Swaminathan Research Foundation
- Senior Advisor to the Global Centre for Adaptation (GCA) and the Africa Adaptation Acceleration Program (AAAP)—the world's largest climate adaptation program.
- She also serves as Adjunct Professor at Cornell University-USA

She is author of two books and numerous peer-reviewed publications and is widely recognized as a speaker and a regular contributor on Agri markets, AI and Digital technology related issues in media outlets such as Devex, CNBC, Financial Times, Hindustan Times, Economic Times.

Her professional journey reflects a deep commitment to advancing agricultural innovation

and ensuring that science and technology translate into tangible benefits for farmers, particularly smallholders. Through her leadership roles, she has worked at the intersection of research, policy, and development to promote inclusive and sustainable agricultural growth.

A one sentence description of her international career would be "India and Indian agriculture at the heart of every piece of global work that she had led".

"Words of wisdom for Young Women in Agriculture"

Young women pursuing careers in agriculture should recognize that the sector today is far broader and more dynamic than it was in the past—it spans science, technology, climate resilience, policy, entrepreneurship, and global development. My advice is to build strong scientific and analytical foundations, remain curious, and be open to interdisciplinary learning, because the future of agriculture lies at the intersection of biotechnology, digital tools, climate science, and social inclusion. At the same time, agriculture requires persistence and courage, as it is still a male-dominated field in many parts of the world. Seek mentors, build global networks, and never hesitate to take leadership roles. Most importantly, remember that agriculture is not just a profession—it is a powerful pathway to improve livelihoods, empower women farmers, and strengthen food and nutrition security for millions.

Dr Agnes Abera Kalibata
Founder and Chair, Connect4Impact Advisory Group (C4Impact), Kigali, Rwanda & Former Minister of Agriculture and Animal Resources, Rwanda and former President of the Alliance for a Green Revolution in Africa (AGRA)

Professional Accomplishments

Dr. Agnes Kalibata is a distinguished scientist, policy maker and thought leader on the global stage. She is the Founder and Chair of Connect for Impact Advisory Group (C4Impact Advisory Group), a mission-driven Social Impact Advisory Firm that supports countries/governments to execute complex public and private sector Agriculture and Food systems program.

Between 2014 - March 2025, Dr Kalibata was President of AGRA, an African-led organization that puts smallholder farmers at the center of the continent's growing economies. In 2021, Dr Kalibata served as the Special Envoy of the UN Secretary-General for the 2021 Food Systems Summit, to catalyse global food systems transformation to deliver on the Sustainable Development Goals (SDGs) and Paris Agreement. In 2023, she served as a member of the Presidential Advisory Committee of COP28 to the UNFCCC where she contributed to shaping and delivery of the COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action that was endorsed by 160 countries. Prior to joining AGRA, Dr Kalibata served as Rwanda's Minister of Agriculture and Animal Resources from 2008 to 2014.

Dr Kalibata is recipient of many prestigious awards including but not limited to the now Africa Food Prize (2012), an Honorary Doctorate from the University of Liège in 2018, and McGill University in 2019, and the National Academy of Sciences' Public Welfare Medal in April, 2019 and in 2024 she was the recipient of the Justus-von-Liebig Award for World Nutrition. She is recognized for her work driving Africa's agricultural transformation through modern sciences, effective policy and more recently, climate advocacy. Dr Kalibata sits on various boards. She holds a doctorate in Entomology from the University of Massachusetts, Amherst.

"Advice for the Next Generation"

I grew up in a refugee camp in Uganda- not an ideal school environment and limited exposure to knowledge in the world. Hard work at every opportunity that was given to me helped me pass exams with good grades. My Dad was an incredible influence as a teacher and he helped set very high goals and made it clear that as a refugee kid the only way out was education and getting good grades. In the work environment, I prioritized delivery and coming through as a way to get things done but also to standing out- helped me get scholarships where my parents would have not been able to pay for me. This ensure that I got a good education.

My contribution as a woman professional has been anchored in my experience growing up; the roles and opportunities. I have been given as a leader and my own dreams of the world that I wanted to see. Having grown up in a rural setting in Africa- you quickly understand that the means available to you are limited, exposure and education opened my horizons for what is possible. I appreciated very early on that good technologies like seeds could end poverty. I have since working with my government made hybrid seed accessible to hundreds of thousands of farmers, which lead to yield increased, created household surplus that resulted in increased incomes for farmers. We demonstrated that there is a clear correlation between increasing yields and reducing poverty.

We reduced poverty in Rwanda by 12% in 5 years. Secondly, I have contributed to strengthening of capacity for agriculture delivery on the continent by working and positioning AGRA as a continental institution with capacity to deliver technology support across multiple areas of the agriculture sector. AGRA has the largest collection of agricultural experts from across the continent under one roof all working to deliver solutions including new delivery models for inputs systems. AGRA now exist as a well-funded African organization that is working to unlock public and private resources for farmers at scale across 10 countries. Third, I led the UN Food Systems Summit and worked with others to define the future of the food systems providing clarity on system definition and clarity of what needed to shift and types of trade-offs. The food systems Summit engaged 3.5 billion people globally, define mechanisms of engagement for government, map solutions to challenges in the food System by and formed coalition of actions to deliver solutions that would transform the food systems providing clarity driven by multiple stakeholders.

I give two messages for the younger generation: (i) work hard in everything- very early find your value system and anchor it on what you stand for - let it drive your behavior and choices; and (ii) Do things you love and that benefit others – this gives meaning to your life.

Dr Soumya Swaminathan
Chairperson, M S Swaminathan Research Foundation (MSSRF), Chennai, India & Principal Advisor, National Tuberculosis Elimination Programme (NTEP), Ministry of Health and Family Welfare, Govt. of India

Professional Accomplishments

Dr. Soumya Swaminathan, Chairperson of MSSRF and former Chief Scientist at the World Health Organization (WHO), is a globally recognized leader in public health and medical research. A pediatrician and global health expert, her four-decade career spans pioneering research, policy leadership, and international collaboration, with a strong focus on improving health equity for vulnerable populations in low- and middle-income countries.

An expert in tuberculosis and HIV research, she previously served as Director General of the Indian Council of Medical Research (ICMR), Ministry of Health and Family Welfare, Government of India (2015–2017), before becoming WHO's Chief Scientist. She assumed the role of Chairperson of MSSRF in February 2023. She also serves as Principal Advisor to the National Tuberculosis Elimination Programme (NTEP) and as National Science Chair of the Anusandhan National Research Foundation, Government of India.

With over 40 years of experience in clinical care and research, Dr Swaminathan has dedicated her career to translating research into impactful health programs. As Secretary to the Government of India for Health Research, her efforts were focused on integrating science into health policy-making, enhancing research capabilities in Indian medical institutions, and fostering global partnerships in health sciences. In 2017, Dr. Swaminathan joined the WHO as Deputy Director General for Programmes and later became its first Chief Scientist, where she established the organization's Science Division. In this role, she coordinated global scientific research, strengthened standards for health guidelines, and promoted digital health innovations. Her leadership was especially critical during the COVID-19 pandemic. She played a key role in coordinating international scientific collaboration and contributed to the establishment of the global COVAX initiative aimed at ensuring equitable vaccine access for low- and middle-income countries. This effort helped highlight the importance of global solidarity and scientific cooperation in addressing public health crises.

Since February 2023, she has served as Chairperson of MSSRF, continuing the legacy of using science for sustainable development. Her current work focuses on the intersections of health, nutrition, climate change, and food systems, with special attention to the well-being of women and children.

Dr Swaminathan received her academic training in India, the UK, and the USA, and has authored over 480 peer-reviewed publications and book chapters. She is a Fellow of the US National Academy of Medicine, the Academy of Medical Sciences (UK), and all major science academies in India. She holds honorary doctorates from prestigious institutions including Karolinska Institute, EPFL Lausanne, and the McGill University, Canada. She currently co-chairs a global commission "Our Common Air" and serves on the Kofi Annan Commission on Food Security. She holds adjunct professorships at Karolinska University (Sweden) and Tufts University (USA).

Currently, Dr Swaminathan serves on the boards of Alliance Bioversity, Population Foundation of India, Institute for Global Environmental Strategies (IGES) and Women Lift Health, among others. She is a member of the Governing Council of the Tamil Nadu Climate Change Mission, member of One Health and Climate Change Strategic Committee, Government of Tamil Nadu and Chairs the Scientific Advisory Board of the Indian Council of Medical Research (ICMR).

During her tenure as WHO's first Chief Scientist, Dr Swaminathan established the Science Division focusing on research, quality assurance of norms and standards, and digital health. She played a pivotal role in coordinating global scientific efforts and was instrumental in setting up Covax to ensure

equitable vaccine distribution to Low and Middle-Income Countries during the COVID-19 pandemic.

Her current focus is on addressing the health impacts of climate change, especially on women and children and food system transformations to strengthen nutrition security in India and regionally.

Challenges and How She Navigated Them

Like many women leaders in science and public policy, Dr Swaminathan's journey has not been without challenges. Working in traditionally male-dominated research and policy environments often required persistence and resilience. Building credibility in global scientific leadership roles demanded strong evidence-based advocacy, collaboration across countries, and the ability to navigate complex political and institutional landscapes.

She addressed these challenges through a combination of scientific rigor, openness to collaboration, and a strong commitment to equity in health. By consistently grounding her decisions in data and public interest, she earned the trust of governments, global institutions, and the scientific community. Her ability to bridge research, policy, and implementation has been a defining feature of her leadership.

A Role Model for Women and Young Scientists

Dr. Swaminathan's career exemplifies the impact that science can have when guided by compassion and social responsibility. She stands as an inspiring example of how scientific excellence, visionary leadership, and social commitment can transform global health. From pioneering infectious disease research to guiding international scientific collaboration during a global pandemic, her career reflects a lifelong dedication to improving human well-being. As Chairperson of MSSRF and a respected global voice in public health, she continues to advocate for science-based solutions to today's most pressing challenges—ensuring that research, policy, and community action work together to build a healthier and more equitable world.

"Lessons for the Leaders of Tomorrow"

Use science and knowledge to solve real-world problems, work collaboratively across disciplines and borders, and remain committed to fairness and equity. For the younger generation, particularly young women aspiring to careers in science and leadership, I emphasize curiosity, interdisciplinary learning, and the courage to pursue meaningful work rather than simply prestigious titles. Scientific knowledge must ultimately serve society, especially the most vulnerable communities.

Dr Shakuntala Haraksingh Thilsted
Global Lead for Nutrition and Public Health, WorldFish (CGIAR), Penang, Malaysia

Professional Accomplishments

Dr Thilsted is the 2021 World Food Prize Laureate for her influential work on nutrition, fish, and aquatic food systems. Often referred to as the "Nobel Prize for Food and Agriculture," the World Food Prize is the most prominent global award recognizing exceptional individuals who have worked to enhance human development by improving the quality, quantity, and availability of food for all.

Dr Thilsted is the first woman of Asian heritage to be awarded the World Food Prize. She was the first to examine the nutritional composition of small native fish species commonly found and consumed in Bangladesh and Cambodia. Her research demonstrated that the high levels of multiple essential micronutrients and fatty acids in these affordable and locally available foods offered life-changing benefits for children's cognitive development in their first 1000 days of life and the nutrition and health of their mothers. From this breakthrough, she went on to develop nutrition-sensitive approaches and innovations to food production, distribution, and consumption that have improved the diets, nutrition, and livelihoods of millions of vulnerable women, men, and children living in low- and middle-income countries across Asia, Africa, and the Pacific.

Her trailblazing work on nutrition in low- and middle-income countries in Asia and Africa show that fish and aquatic food systems are an integral part of food production, local diets, culture, child and maternal health, and general wellbeing. Her scientific findings demonstrate fish, and aquatic foods must occupy a more central role in future nutrition-focused interventions and policy and investment decisions for agricultural research and development and a sustainable transformation of food systems towards healthy and resilient diets.

A true food systems thinker, the impact of Dr. Thilsted's research crosses over different disciplines and sectors. She is credited with developing the pond polyculture system, a cost-effective and environmentally sustainable way of farming small and large fish species together in homestead ponds, water bodies, and rice fields. This innovation which helped to significantly increase the quality, diversity, and quantity of available food, prompted a large-scale shift towards aquaculture production in Bangladesh. In addition, it led the Government of Bangladesh to recognize the pond polyculture system as a critical innovation for meeting national targets to beat hunger, malnutrition, gender inequality, and poverty.

Working together with local communities and private sector actors, Dr Thilsted guided the development of innovative, affordable, and culturally acceptable fish-based products suitable for consumption by young children and lactating women. She discovered these products were nutrition powerhouses in their own right, and – when consumed with other foods – they also helped increase the absorption or bioavailability of other essential micronutrients found in vegetables and rice, such as iron and zinc.

Dr Thilsted's influential research work on harvesting and processing in fish and aquatic food systems have enabled women in the sector to overcome gender barriers, to increase the visibility of their work in and contributions to the aquatic foods sector, to improve their access to affordable, nutritious fish and other foods, to increase incomes, and to create new business and economic opportunities. In addition, her work has guided the development of national campaigns and community programs to raise awareness and improve knowledge about nutrition and the critical inclusion of fish and aquatic foods in healthy and balanced diets for malnourished women and children.

Her scientific work on nutrition-sensitive approaches to food production from land and water have turned traditional thinking about agricultural research and food systems solutions on its head. She puts nutrition and public health outcomes at

the heart of critical questions about how foods -- from land and water -- are produced, processed, transported, costed, distributed, and consumed. Dr. Thilsted's impressive body of research innovations is shifting the dial on global narratives of food production to higher food systems thinking from questions of 'feeding' a growing global population to a more enlightened discourse on 'nourishing' billions of people, nations, and our precious blue planet. In addition, her work on nutrition, fish, and aquatic food systems in low- and middle-income countries is inspiring a new generation of women in science, food systems thinkers, and aquatic foods champions.

A passionate and inspiring scientific leader at WorldFish, CGIAR, and globally, Dr. Thilsted's critical insights shaped the formulation of the new disruptive 2030 WorldFish Research and Innovation Strategy: Aquatic Foods for Healthy People and Planet.

She is a UN Food Systems Champion and serves as the Vice-Chair for Action Track 4: Advance Equitable Livelihoods of the upcoming 2021 UN Food Systems Summit. In addition, Dr Thilsted is a member of the High-Level Panel of Experts on Food Security and Nutrition and advises the High Level Panel for a Sustainable Ocean Economy.

A native of Trinidad and Tobago and a citizen of Denmark, she received her bachelor of science degree in Tropical Agriculture from The University of West Indies. She completed her post-graduate and doctorate studies in nutrition physiology at the University of Copenhagen. A CGIAR scientist, Dr Thilsted is currently the Global Lead for Nutrition and Public Health at WorldFish, working to bring aquatic foods to the heart of the global science and policy discourse on sustainable food systems transformation towards healthy and resilient diets.

"Wisdom to Carry Forward"

In choosing a field of study and career, be guided by your interests and the subjects that you like. In your studies, be sure to develop mentors – who can guide you along a path, discuss new horizons, and share their expertise and dreams. Thereafter, use every opportunity to teach, mentor, advice, so that your knowledge and work can lead to the greatest benefits for as many people as possible. Let us all truly use this year (2026), the International Year of the Woman Farmer, to give voice and opportunities to very many women and young females –throughout the food systems so that we can transform food systems to nourish all people, leaving no one behind, and at the same time, sustain the planet.

Dr Renu Swarup
Conference Chair GCWAS-2026 & former Secretary, Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India

Professional Accomplishments

Dr Renu Swarup, is the Former Secretary, Department of Biotechnology (DBT), Government of India. Having served in Department of Biotechnology for over 30 years, she was also the Chairperson of Biotechnology Industry Research Assistance Council (BIRAC), and held the Additional Charge of Secretary Department of Science &Technology for a short period.

A PhD in Genetics and Plant Breeding, she did her Post-Doctoral Research at The John Innes Centre, Norwich UK, in Applied Genetics. As a Science Manager, issues related to policy planning and implementation were a part of her assignment. She was actively engaged in the formulation of National Biotechnology Vision and Strategy in 2001, 2007, 2015 and 2021. Dr. Renu Swarup was instrumental in the planning and implementation of several National programmes viz., Spatial Characterisation of Biodiversity, Second Generation Bioethanol, Drugs from Microbes, National Biopharma Mission, Antimicrobial Resistance, Genome India and others. She played an important role in promoting plant biotechnology in the country, and was responsible for setting up the First Tissue culture Pilot Plant. She has contributed immensely to creating an enabling policy framework and building Human resource and infrastructure for the Biotech sector, specially in Agriculture Biotechnology. She played a crucial role in developing the Regulatory Guidelines issued by the Govt. of India to facilitate release of Gene edited plants. She was responsible for initiating major programmes for Women in STEM and was a member of the Task Force on Women in Science constituted by the Scientific Advisory Committee to the Prime Minister.

As the Secretary, Department of Biotechnology, she led a Network of 16 Autonomous Research Institutes, 2 Public Sector Undertaking and a R&D Network of more than 5000 projects across more than 100 research institutes, Universities and Laboratories. During the COVID Pandemic she led the COVID Vaccine, Diagnostic and Genome Sequencing Mission. The Public Sector BIRAC, for which she was the founding Managing Director and then Chairperson, has supported more than 10000 Startups and over 100 Incubators. A Fellow of the Indian National Science Academy (INSA), National Academy of Sciences (NASI) India, A Life Member and Trustee of the Trust for Advancement of Agricultural Sciences (TAAS) and a Member of the Organization for Women in Science for the Developing World (OWSD), she was awarded the "Yashwantrao Chavan Award for Public Policy" in 2023 ,and the FABA Biotech Excellence Award in 2024. She is also a recipient of the "BioSpectrum Person of the Year Award" in 2012, "National Entrepreneurship Awards 2017", TiE Women Enabler Award 2018, "Dr. P. Sheel Memorial Award" 2018 by NASI, and the TWAS Regional Office Prize on Science Diplomacy in 2018. She has been awarded the Agriculture Research Leadership Award 2019, Smt. Chandaben Mohanbhai Patel VASVIK Award for Women Scientific & Chemical science & Technology 2020-21, Life Time Achievement Award for Biotech Policy maker, 2021 by Golden Jubilee Women Biotech Park .She was also recognised as Business World Women of 2019 & 2020.

She is currently the Vice Chair of the International Centre for Antimicrobial Resistance Solutions (ICARS) Copenhagen, Denmark, and Member of the Scientific Expert Group of the International Pandemic Preparedness Secretariat, Govt of UK; Advisory Board of WHO for the National R&D Framework, and Advisory Board of the Hiroshima G7 Global Health Follow up initiative. She is also a Member of the Board of Trustees of the M S Swaminathan Research Foundation; the Chair of the Governing Body of the Indian Association for Cultivation of Science, Department of Science &Technology, and a Member of the Board of Governors of ICMR ,AsCIR and IBEF, besides being the Chair of a number of Government Committees.

A Crusader for Women Leadership

Women in agriculture are of special importance. To meet our agricultural growth targets, the full participation of women is essential. Women are active in every aspect of agricultural development, from research to industry and farming, contributing to increased productivity and production. However, their numbers are often small, especially in decision-making positions, leading to a clear absence of gender balance.

Women participation in decision-making is most important for socio-economic development and this is most critical for the Agriculture sector We have now for many years discussed the issue of gender diversity ,we have agreed that we need to see more women at the top and as part of the decision making process ,we have also agreed that we need to work towards creating an enabling framework to facilitate this process .What we now need to do is collectively deliver on the ground

To build effective women leadership, bring in gender sensitive policies and programmes and see progressive outcomes in decision making, it is imperative that we focus on nurturing women leadership, and also empowering our women at the grassroot level both technologically and socially. The participation of women in all sectors is changing ,we see more numbers now —- whether it is as Researchers ,or Investigators or Women in the field — but does this translate to actual numbers on the top and at the grassroot .. We need more numbers on the ground to ensure that we can feel the difference in our programmes and most importantly on the Action and Impact .

What then is it that needs to be done. It is important to take up the necessary initiatives for women development and strengthening their skills and capacities specially for mid career and senior leaders across the value chain of Agri food systems .However we must specifically. design programmes which help nurture our women at the ground .

We have some very interesting examples of Women being champions of change both for adoption of new technology and appropriate decision making to implement these on scale for creating an impact. When we look at Women in Academia and Industry again it is imperative to understand what are their challenges and how research efforts have been driven by women for women.

Personal Journey

As a Researcher I have personally been engaged in Applied Genetics and Plant and Forest Biotechnology. On my return from John Innes Institute, Norwich, UK, after my Post Doc ,the position of Science Manager in the Government of India gave me an opportunity to promote Biotechnology research in the country .I was fortunate to be able to develop initiatives for Women in Science and also support programmes which focussed on Science for Women, which were critical to develop technologies and extension service packages to benefit women . For over 30 years my involvement in building women leadership yielded positive results —from increased number of women researchers, to technologies and products of special relevance to benefit women. A special scheme for reentry of women scientists — BioCARE was launched. A special focus was laid on building an enabling ecosystem to promote Start-ups. The number of women start-ups increased over the last few years to reach around 25-30% .Special agriculture-based incubators and women-based incubators were set up .

As the Secretary in the Government of India ,it was a privilege to be able to contribute to Agriculture development programmes —from regulatory guidelines to enable release of gene edited plants, to building capacities both human resource and Infrastructure for cutting edge technologies across the country .

"Four C's of Leadership for Women in Agriculture"

My message to the young women who are engaging in agriculture is that you have to carry the baton forward .There are enormous opportunities, you have to recognise your strength within and remember your contribution is critical .Each young women engaged in agriculture must strive to be a role model and a champion for enhanced gender participation, ensuring Gender Equality and Gender Equity. To achieve this it is important that you focus on the four C's - Confidence on your ability, Commitment to deliver, Courage to take risk and Conviction to accomplish.

TECHNICAL SESSION II:
DRIVING PROGRESS, ATTAINING NEW HEIGHTS

Empowering Women in Agriculture: A Transformative Journey toward Equality and Sustainability

Subroto Geed
President, South Asia, Corteva Agriscience, Hyderabad

At the Global Conference for Women in Agriculture, the President – South Asia of Corteva Agriscience will deliver a message on why corporates must play a transformational role in advancing gender equity across agri-food systems. The address will underline that women are central to farm productivity, food security, and rural prosperity, yet continue to face systemic barriers in access to inputs, markets, finance, land rights, and decision-making platforms.

The lecture will spotlight the 2 Million Women in Agriculture initiative — a strategic commitment to enable two million women across the agricultural value chain by 2030. The initiative focuses on strengthening women-led Farmer Producer Organizations (FPOs), building entrepreneurial and leadership capabilities, improving access to climate-smart technologies, and integrating women farmers into formal markets.

Emphasizing that inclusion must move beyond philanthropy, the President will outline how corporates can embed gender responsiveness into core business strategies — through partnerships, innovation, capacity building, and measurable impact frameworks.

The session will conclude with a call to action for governments, private sector leaders, academia, and civil society to collaborate in creating resilient, equitable agricultural ecosystems where women are not just participants, but leaders shaping the future of farming

Gender-Transformative Strategies for Inclusive Innovation in Agri-Food Resilience

Dr. Maureen Miruka
Director, Gender Equity, Youth and Social Inclusion (GEYSI), CIMMYT, Mexico

Agri-food systems across low- and middle-income countries face intensifying pressures from climate change, economic shocks, conflict, and rapid technological transitions. While women play central roles across production, processing, marketing and household nutrition, structural gender inequalities continue to constrain their access to innovation, decision-making power, productive resources and leadership. As a result, many agricultural innovations—however technically sound—fail to deliver equitable or resilient outcomes.

This presentation argues that strengthening agri-food system resilience requires moving beyond gender-responsive and gender-accommodative approaches towards **gender-transformative strategies** that explicitly address the social norms, power relations and institutional structures shaping innovation systems. Drawing on global experience with Gender-Transformative Approaches (GTAs) advanced within international agricultural research and development and humanitarian and development practice, the presentation highlights how GTAs reposition women, men and youth not only as beneficiaries of innovation, but as agents of change within households, communities, markets and governance systems.

The presentation will synthesise emerging evidence on how gender-transformative strategies can enhance the inclusiveness and effectiveness of agri-food innovations by: (i) strengthening women's voice, agency and leadership in technology design, validation and scaling processes; (ii) enabling more equitable control over productive assets, information and digital tools; (iii) shifting restrictive gender norms that limit women's mobility, labour choices and participation in markets; and (iv) embedding accountability for gender equality within innovation institutions, partnerships and delivery systems.

Particular attention is given to how gender-transformative strategies interact with climate-smart and resilience-oriented innovations. By addressing intra-household decision-making, labour allocation, risk management and access to climate information and finance, GTAs can improve the adoption, sustainability and impact of innovations designed to strengthen climate adaptation and livelihood resilience. The presentation further highlights the importance of intersectional perspectives to ensure that gender-transformative innovation pathways respond to the differentiated realities of young women and men, indigenous communities and other socially marginalised groups across diverse agri-food systems.

The presentation concludes by proposing a practical agenda for integrating gender-transformative strategies into national and regional innovation ecosystems—spanning research, extension, private sector engagement and policy processes. It emphasises the need for stronger institutional incentives, capacity development and measurement frameworks that enable innovation actors to track changes in norms, agency and power, alongside conventional productivity and adoption indicators.

By placing gender transformation at the centre of inclusive innovation, the presentation demonstrates how agri-food systems can achieve not only higher and more sustainable productivity, but also more equitable, adaptive and socially resilient development outcomes in the face of growing global uncertainty.

Building a Socially Responsible Enterprise in Emerging Markets The Case of Victoria Seeds Limited

Josephine Okot
Vice Chair, IFDC and MD, Victoria Seeds Ltd., Uganda

In emerging markets, business in agrifood systems are never just business. With the advent of climate change and its devastating impact on food security, agribusinesses have become critical tools for sustaining human life just like health care services while at the same time intersecting with national security priorities of governments. Enterprises now operate at the intersection of livelihoods, food security, gender equity, and environmental stewardship. A socially responsible enterprise understands that it must integrate ethical practices, environmental stewardship, and community empowerment into the core of its business strategy. Profit remains important, but it is pursued alongside positive social impact, long-term resilience, and shared value.

Emerging markets present unique challenges and opportunities. Limited infrastructure, constrained access to and high cost of finance, climate vulnerability and persistent gender gaps. At the same time, these markets also present immense opportunities for value addition with a young workforce and women smallholder farmers whose work sustains local food systems but their contributions are often undervalued and under-resourced. A socially responsible enterprise recognizes this imbalance and seeks to correct it, not exploit it by responding with innovative, inclusive approaches that create value for both the business and the communities it serves.

A compelling example from East Africa is Victoria Seeds Ltd of Uganda. Founded in 2004 by entrepreneur Josephine Okot, Victoria Seeds began with a mission to improve access to quality seeds for smallholder farmers—a critical bottleneck in crop productivity. The company now operates multiple processing facilities, markets a wide range of seed varieties, and has developed a distribution network of hundreds of agro-dealers serving farmers in Uganda and neighboring countries.

What sets Victoria Seeds apart is its deliberate focus on women's empowerment within the agrifood system. The company recognized early on that women play a central role in food production , yet often lack access to inputs, training, and markets. In response, Victoria Seeds intentionally integrated women into its seed production and supply chains through training programs, fair contracting, and capacity building. Victoria Seeds engages women in its supply chain, with more than 70% of its seed-producing partners being women. This not only improves agricultural productivity but also strengthens women's economic independence and community leadership.

Victoria Seeds illustrates how socially responsible practices can be aligned with international development goals. The company's strategy references Sustainable Development Goal 5 - Gender Equality and operationalizes it through measurable initiatives that expand women's roles in agriculture and agribusiness leadership. Moreover, Victoria Seeds demonstrates responsibility in business operations by introducing accessible seed packaging, maintaining fair pricing for smallholders, and using mobile distribution channels to reach remote regions. These practices reflect an understanding that social responsibility in emerging markets must be context-specific and responsive to the actual barriers faced by farmers.

The success of Victoria Seeds demonstrates that building a socially responsible enterprise in emerging markets requires vision, commitment to community priorities, and a willingness.

Technical Session III:
Mainstreaming Gender Equality and Social Inclusion.

Policy as a Catalyst for Gender Equality in Agri-Food Systems

Nitya Rao

Women constitute almost 60% of the agricultural workforce in India yet own only about 13% of agricultural land. This lack of control over land denies them recognition as farmers and consequently access to a range of resources and services including water, credit, markets, technology and extension, as well as compensation for losses due to climatic and other hazards. Despite hard work, the productivity of women's farms remains lower than that of men, their contributions undervalued, and their working conditions often precarious.

The United Nations' declaration of 2026 as the International Year of Women Farmers is important. Building on the Sustainable Development Goals (1, 2, and 5 in particular) and the Voluntary Guidelines on Gender Equality and Women's and Girl's Empowerment in the context of Food Security and Nutrition endorsed by the Committee on World Food Security (CFS) in 2021, it places the spotlight on the persistent discrimination against women as farmers. It calls for public policy frameworks to right this wrong, critical to achieving the vision of ending hunger and ensuring food security and nutrition for all. There is adequate evidence to show that women's equal entitlements to resources and services, including access to and control over land, lead not just to productivity gains, but have multi-dimensional impacts on household welfare, nutrition and women's own empowerment.

Markets and private services (credit and extension) can be both exclusionary and extractive, making them difficult for women farmers to access. Given the scale and pervasiveness of gender discrimination, the women's movement too has persistently called for state support to achieve equality – legally, in policy and practice. While India has a range of policies to support farmers and agriculture, including PM-Kisan, Kisan Credit Card, PM Krishi Sinchai Yojana, amongst others, women farmers remain largely excluded. For example, while extension services are increasingly being delivered through digital tools and technologies, the persistent digital divide, especially in rural and tribal areas of North and East India, risks deepening gender inequality in access to information. In the absence of land titles, women are deprived of adequate, reliable and low-interest credit, and often end up with private providers, paying high rates of interest.

This is an opportune moment for the national government to commit to the achievement of gender justice, through ensuring women farmers' entitlements to land and related resources alongside policy coherence between and across public sector policies at different levels and scales.

PLENARY LECTURES

Gender Equality and Equity for a Sustainable Agrifood Future

Agnes Kalibata
Founder and Chair, Connect4Impact Advisory Group (C4Impact), Kigali, Rwanda & Former Minister of Agriculture and Animal Resources, Rwanda and former President of the Alliance for a Green Revolution in Africa (AGRA)

Across Africa, India, and the Global South, women comprise 33–50% of the agricultural labor force, yet face persistent barriers in land ownership, finance, extension services, markets, and leadership. These structural constraints suppress productivity, weaken climate resilience, and limit inclusive economic growth.

There is sufficient evidence to show that closing gender gaps in agriculture could increase yields by 20–30% in some contexts, agricultural output in developing countries could rise by 2.5–4%, global hunger could decline by up to 17%, women's income control improves nutrition, education, and household resilience and women's participation in decision-making strengthens climate adaptation outcomes.

What needs to be done: Equity, commitment and follow-through are critical to correcting for structural disadvantages of gender inequality. Equity requires targeted reforms in land tenure, access to finance, extension services, digital inclusion, and reduction of unpaid care burdens. It also requires governments to be deliberate and prioritize action in the following areas:

1. Embed gender metrics into national agrifood investment plans and budgets.
2. Align climate finance and adaptation programs with gender-responsive criteria.
3. Accelerate land titling and inheritance reforms to secure women's asset ownership.
4. Establish blended finance and credit guarantee schemes for women-led agribusinesses.
5. Invest in rural infrastructure (water, energy, childcare) to reduce time poverty.
6. Cost care giving and factor it on time demands for women
7. Advance/support/c Create opportunities for women in science and in leadership

Conclusion: Gender equality and equity are structural drivers of productivity, resilience, and food security. Gender equality in agrifood systems is macroeconomic policy, climate strategy, and food security insurance; it has potential to increase yields by 30%, increase agricultural output in developing economies and reduce global hunger by up to 17%.

In a constrained fiscal environment, unlocking underutilized human capital is among the highest return investments available. Gender Equality in agrifood systems is an opportunity to build a sustainable agrifood future anchored on equal participation and thus stronger foundation.

Did the Self-help group (SHG) movement address empowerment and livelihood development needs of India's female farmers?

Prabhu Pingali
Cornell University, USA

This paper examines the question of how collective action by India's female farmers, which composes 76% of India's working women, has affected their agricultural livelihood development as well as their personal and collective empowerment. Specifically, it assesses the benefits and shortcomings of the self-help group (SHG) movement for female farmers' and examines whether the SHG experience has provided women greater agency and managerial skills to be successful in other forms of market oriented collective action, such as farmer producer organizations (FPOs).

Women's SHGs in India started in the 1990s to increase livelihood development opportunities for women through collective savings and microcredit to drive household savings and female entrepreneurship. Over the past several decades, the government of India promoted over 9 million SHGs and dispersed loans amounting to ₹12 lakh crore under the National Rural Livelihoods Mission. Studies into this unprecedented level of investment has shown mixed results for female farmers. On the one hand, SHGs have been shown to be an effective avenue for empowering women. Group coordination and management have developed new capabilities for women, such as skills and experience in democratic governance, financial management, and group decision-making. Group interaction and cooperation have created bonds of mutual support, trust, and reciprocity. Women's access to capital through microcredit has also shifted social norms within households and drawn women into new social spaces beyond the home.

In terms of advancing female farmer's agricultural livelihood development, however, SHGs have largely fallen short. Microcredit has not provided the type of capital infusion needed to increase agricultural production, productive asset management, and commercialization. Also, SHGs have not empowered female farmers in critical agricultural areas, where they have faced entrenched gender norms or discrimination, namely land ownership and market participation. Does the FPO model of small farm aggregation help address SHGs shortcomings for female farmers?

The Government of India has been promoting FPOs in large numbers as a means of aggregating small farms to bypass the market failures that individual small-scale farmers face. As an FPO, farmers collectively access agricultural inputs, purchase machinery for value-added products, and sell goods at stable market prices at greater economies of scale. In theory, FPOs address a number of the shortcomings small-holder female farmers experience through SHGs by centering collective action on agricultural activities and commercialization.

Our researchers at Tata-Cornell Institute compared case studies of six well-established women-led FPOs across different regions of India that transitioned from SHGs to FPOs. We studied both how they successfully transitioned as well as the personal and collective outcomes that resulted from their FPO participation through key informant interviews and focus group sessions with FPO members, non-members, leadership and civil society promoting organizations.

What we found was that SHGs were highly useful experiential learning environments for female farmers to build capacity to manage an FPO. SHG members had built social capital within and across SHG groups for FPO formation. Once created, FPOs drew on capabilities they developed as an SHG, including organizational management, governance, conflict resolution, entrepreneurship, and financial literacy. Lastly, SHG participation gave women credibility within their household so that many male members supported female members' FPO participation because of the livelihood benefits realized through the SHG.

We found that FPOs provide clear benefits for female farmers that SHGs were unable to provide. One of the main reasons female farmers formed an FPO was to access input markets through joint purchase. FPOs provided support to increase agricultural productivity and the means to procure productive assets. Some women-led FPOs required land ownership for FPO membership, compelling

some male household members to add female members to their title because of perceived benefits from FPO participation.

While FPOs addressed many of the shortcomings of SHGs for female farmers, stubborn barriers to agricultural development persisted. While a few women were added to land titles, male refusal to add women to titles meant that FPOs modified their rules to allow women with leased or household land to join. Many women-led FPOs have adapted to land access barriers by retreating to traditional female agricultural livelihood activities, such as livestock care, or by taking up agricultural livelihood activities that do not require land, such as indoor mushroom cultivation. Similarly, women face barriers to markets due to inexperience and gender norms. In each case where women-led FPOs successfully engaged with buyers, it was facilitated by civil society organizations.

Our national assessment of over 45,000 FPOs reveals that women-led FPOs have lower failure rates and higher financial performance than their male-led counterparts. From our case studies, we find that overall women-led FPOs demonstrate conservative financial management and strong liquidity but require enhanced profitability strategies and operational efficiency improvements for long-term sustainability.

Technical Session IV:
Emerging and Disruptive Technologies for Gender-Transformative Change

Empowering Women, Transforming Agriculture: The Power of Women-Centric Technologies

Shireen Assem
Agricultural Research Center, Egypt

Women are key contributors to global food production and household nutrition, they play a crucial role in agriculture. Women-centric technologies can help improve agricultural productivity, strengthen livelihoods, and promote gender equality. However, they often face structural barriers that limit their full participation and productivity in agricultural systems.

Empowering women farmers is essential for building resilient food systems and supporting sustainable rural development. The main objective is to demonstrate how technologies designed specifically to meet the needs and circumstances of women farmers can transform agricultural productivity and improve livelihoods.

There are many challenges faced by women in agriculture. These include limited access to critical resources such as land, credit, and modern technologies. Women farmers also often face barriers in accessing markets and negotiating fair prices for their products. In addition, many women experience time poverty due to the combination of agricultural responsibilities and unpaid household and caregiving work. Limited access to training, extension services, and information further restricts their ability to adopt improved farming practices and innovative technologies.

To address these barriers, we introduce the concept of women-centric technologies—innovations designed specifically to respond to women's needs, constraints, and roles in agricultural systems. Examples include mobile applications that provide weather forecasts, market information, and agricultural advisory services, enabling women farmers to make better-informed decisions. Digital payment systems and mobile money platforms also play a critical role by promoting financial inclusion and giving women greater control over their earnings. Climate-smart agricultural technologies such as drip irrigation help increase water efficiency and improve crop productivity, while small-scale mechanization and labor-saving tools reduce the physical burden associated with manual agricultural work. Climate smart crop varieties are resilient to climate change, saving the crops' yield and water use efficient.

The adoption of women-centric technologies can generate significant benefits. These include higher agricultural productivity, increased farm income, improved food security and nutrition, and reduced labor burdens for women. Access to these technologies can also strengthen women's participation in decision-making processes within households and communities, contributing to broader empowerment and social inclusion.

Two case studies are presented to illustrate these impacts. The first describes the use of a mobile application that provides weather forecasts, early warning systems, and farming advice to farmers in rural areas of Egypt. This digital tool has helped farmers improve crop yields, manage risks more effectively, and increase their incomes. The second case study focuses on digital payment platforms used in Kenya that allow women farmers to receive payments directly into their bank or mobile accounts. These platforms have enhanced financial inclusion, reduced transaction costs, and improved financial security for women.

Several challenges must be addressed to maximize the impact of these technologies. These include the need to scale up successful innovations, address gaps in digital literacy, and ensure equitable access to technology and digital infrastructure. At the same time, these challenges present opportunities for innovation, partnership, and collaboration among governments, research institutions, development organizations, and the private sector.

Key recommendations: increasing investment in women-centric technologies and digital agricultural solutions, strengthening training and capacity-building programs for women farmers, technology transfer of best practices for the newly developed climate smart crop varieties, promoting partnerships across sectors, women inclusion in the whole value chain of agricultural production, and developing supportive policies that facilitate women's access to resources and technology.

In conclusion, empowering women through inclusive technological solutions can significantly transform agriculture. By supporting women farmers and expanding access to relevant technologies, it is possible to improve productivity, strengthen rural livelihoods, and advance sustainable and equitable agricultural development.

Technical Session V:
Building Women Leadership in the Agri-Food Sector

Advancing young women's leadership in agrifood systems: transforming food systems

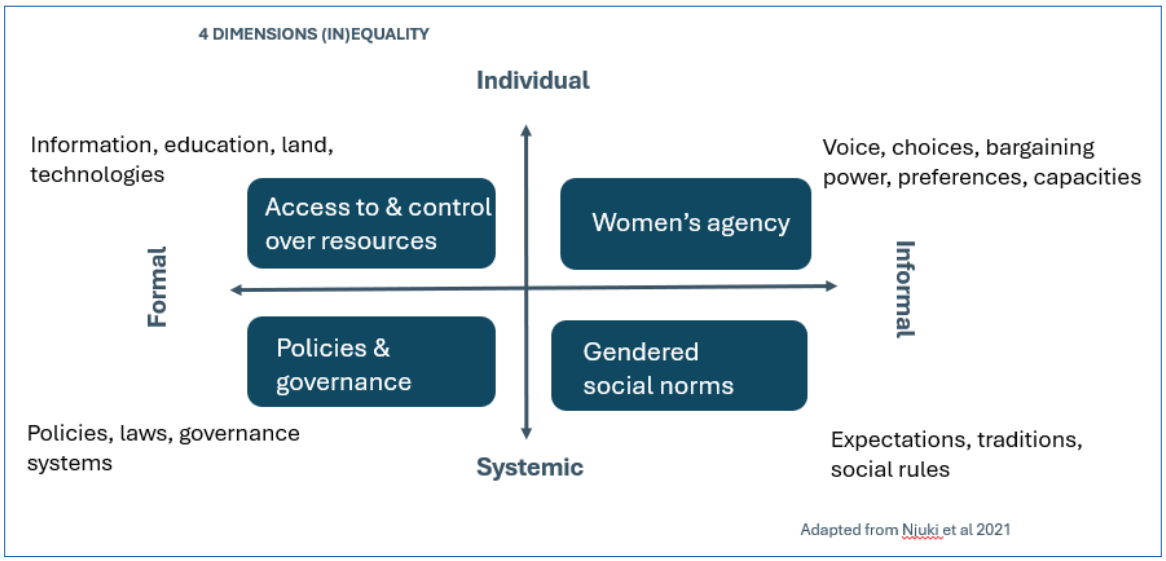
Nicoline de Haan
CGIAR GENDER Accelerator
Jordan Kyle (IFPRI), Dina Najjar (ICARDA), Miranda Morgan (Alliance of Bioversity and CIAT)
and Marlene Elias (Alliance of Bioversity and CIAT)

Achieving just and resilient agrifood systems in the future requires the full and effective participation and leadership of young women. Young women are key to the food systems. For rural women aged 15 to 24 agrifood systems can be a key source of employment and globally, it is known women of all ages provide between 40-60% of agricultural labor[1]. They are engaged on farm and off farm, at various nodes in the value chain, and at different scales throughout the agrifood systems. Leadership roles for young women are there throughout the sector, from cooperatives to producers' organizations, to agribusiness, to SMES, to research organizations, to public sector and all the way to community and household decision making processes.

To understand the imbalance, between the contribution of women, and potential contribution of young women, and their leadership and decision-making power, issues such as perceptions of women's leadership, discriminatory norms and values, as well as inequitable legal and policy frameworks, unequal access to resources, and limits to a woman's voice, need to be scrutinized[2]. The framework developed by Njuki et al (2021[3]) is a useful tool to bring all these aspects together and is an approach to understand where the structural barriers are and how they can be unlocked for rural young women to become effective leaders.

A sample of the work done within the CGIAR on leadership, include efforts on measuring voice in national agrifood policymaking: the development of and piloting of WEAGov - a new tool to measure women's voice in national agrifood policymaking, and piloted it with 400+ agrifood policy experts in India and Nigeria. This work moves beyond counting women's representation to assessing whether women meaningfully shape policy design, implementation, and evaluation—creating actionable diagnostics for governments and institutions seeking to nurture young women leaders.

Building voice through group-based trainings[4], in rural Nigeria, group-based empowerment trainings



significantly increased women's participation in community governance, improved the quality of their engagement, and strengthened leaders' responsiveness to women's policy preferences. Women went on to lead community development initiatives—demonstrating that mentoring and peer-based models can translate voice into visible leadership. Similarly, theatre-based norm change approaches in MENA created space—especially for young women—to speak about inheritance, mobility, and voice, demonstrating how collective, arts-based approaches can unlock agency.

Thus, effective support for young women leaders requires moving beyond isolated individual capacity-building efforts toward more holistic and enabling agrifoods systems. Leadership development initiatives need to be embedded within broader efforts to transform policies, norms, and incentive structures across research, policy, and practice in agrifood systems.

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Reshaping Gender Dynamics and Leadership Roles to Transform Asian Food Systems

Tamara Jackson
University of Adelaid, Urrbrae, Australia

The need for transformation of Asian food systems is driven by growing population pressures, climate challenges, geopolitical shifts and resource constraints. By its very nature, transformation of the food system necessarily requires collaboration because for it to occur it involves shifts in systems and networks of actors. Transformational change can entail changes in suites of technologies, institutions, values and political systems, as well as different forms of leadership and the nature of interactions between different stakeholders (Mapfumo *et al.,* 2017). Gender dynamics and leadership must be explicitly integrated to ensure inclusive, equitable, and effective transformation.

Agricultural research plays a critical role in the food system, and to be most effective needs to be strongly connected to other components of the system. This means that a range of stakeholders across communities, governments, research and industry need to be able to work together to achieve transformational change. Collaborative, gender-responsive leadership is a critical part of achieving systemic change.

Transformational change is a multidimensional and multi-attribute process (Mapfumo *et al.,* 2017), so measuring and monitoring changes must be considered carefully (Leeuwis *et al.,* 2021; Stefanovic et al., 2020). This means we need new ways of conducting research and development using collaborative, evidence based approaches that can help bring different stakeholders together to define problems, identify and implement solutions, and monitor impacts and outcomes. Gender dynamics and leadership need to be explicitly considered in any change process.

We present a practical, process-based evolution of a gender strategy that is a dynamic, negotiated practice shaped by learning, contextual adaptation, and trade-offs across disciplines, countries, and social hierarchies.

This paper describes a gender and inclusion strategy within a cross-country, transdisciplinary agricultural diversification project implemented in India, Nepal, and Bangladesh. Drawing on the project's longitudinal experience, the paper documents how gender was approached both as a standalone objective and as a cross-cutting lens embedded across all project components, moving beyond checklist-based inclusion toward addressing structural inequalities shaping access to resources, participation, and benefits from diversification. Key activities underpinning the strategy included iterative strategy discussions, context-specific gender training, cross-country review meetings, ongoing engagement with field teams, and systematic documentation of gender-relevant data. These processes enabled continuous reflection on inclusion trade-offs, particularly where project efficiency and gender equity came into tension.

The analysis highlights key learnings around power and participation, the differentiated impacts of diversification pathways across social identities, the limits of visible but non-transformative participation, and the risks of "success selection" that may inadvertently exclude the most marginalised. The paper also identifies unrealised opportunities for deepening inclusion such as non-plot livelihood pathways, nutrition-linked interventions, and richer use of intra-household data, while demonstrating the necessity of embedding gender considerations across productivity, profitability, nutrition, and climate resilience objectives. By documenting learning processes rather than outcomes alone, the paper contributes a practice-based account of how gender strategies evolve in real time. In doing so, it bridges the gap between funding-level gender frameworks and the everyday practices of transdisciplinary research, offering insights for future project design and gender-transformative strategies in the Global South.

Gender-Responsive Agricultural Research & Extension: Pathways for Equity and Equality

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Women constitute significant share of India's agricultural workforce and play a pivotal role in agri-food system including crop production, livestock, fisheries, post-harvest management, and household nutrition. According to the Periodic Labour Force Survey (PLFS) 2023-24, 44.4% of rural households depend on agriculture where 76.9% of rural female workers are engaged in agriculture, compared with 59.8% of rural male workers. Recent findings indicated that women's participation either independently or jointly among rural agricultural households' averages 59.28% in crop production (16 surveyed states), 72.2% in horticulture (14 states), 68.34% in dairy (12 states), 67.33% in poultry (8 states), 75.52% in fisheries (8 states), 74.4% in forestry (8 states) and 69.2% in post-harvest activities (16 states) which signifies the active involvement of women in all sectors of agriculture (ICAR-CIWA study 2025).

Despite active involvement of women in major agriculture and allied activities, there exist persistent gender gaps in access to resources, technologies, information, institutional support, and decision-making, etc. which constrain productivity, sustainability, and their overall empowerment. Gender-neutral approaches mask structural inequalities and uniform interventions fail to reflect gender-differentiated roles and constraints in agriculture, negatively affecting their efficiency and effectiveness in agri-food system and livelihood of farm families. Recognizing these, ICAR-CIWA has made significant effort in generating evidences, developing women-centric and gender-responsive technologies, designing transformative research and equity-focused extension models, and strengthening grassroot institutional capabilities to support all the stakeholders. The achievements confirm that bringing gender equity across the agricultural innovation system enhances technology adoption, reduces drudgery, strengthens institutional responsiveness, promotes equality in participation and decision making, thereby contributes to women's empowerment.

Strengthening the institutional ecosystem for gender mainstreaming within National Agricultural Research Extension and Education System (NAREES) is the need of the hour to systematically address long standing gender gaps, enhance the relevance and effectiveness of research, education and extension for inclusive, equitable and sustainable agri-food systems. The conceptualization and development of the ICAR Gender Strategy along with Gender Framework for 'Krishika Shakti' and Sustainable Agri-food System (GF-Krissa) and Gender Framework for Sustainable Agri-food System and Empowerment of Women in Agriculture (GF-SAEWA) are the strategic efforts in this direction. In line with the Gender Strategy, Framework for Strengthening Gender-Responsive Agricultural Research and Extension through Nodal Officers in NAREES, has also been developed by ICAR-CIWA to ensure gender equity in agriculture.

Gender-disaggregated data in agriculture are not readily available and the existing information remains scattered across multiple departments and sources, there is a need to integrate data from diverse sources to support evidence-based policy, planning, monitoring, and gender-responsive interventions. The development of National Information System for Women in Agriculture (NISWA) portal is another milestone, which serves as a national repository of gender responsive (GR) technologies/ package of practices (PoPs), GR-methodologies, schemes for women farmers, gender factsheet of institutions, women innovators, gender disaggregated data on participation and time contribution from secondary and primary sources and related resources. This online database aims to strengthen policy advocacy, programme design, and monitoring, enabling NAREES organizations to move from subjective gender inclusion to data-driven gender responsive research and extension.

Technologies are generally developed often overlooking the specific gender preferences, needs, and constraints in agricultural activities. As a result, women farmers frequently face barriers in accessing, adopting, and benefiting from these technologies,

which limit overall development of society. A core achievement of ICAR-CIWA lies in advancing gender-transformative research approaches that go beyond addressing practical needs to challenge structural constraints faced by women in agriculture. Through participatory research prioritization, co-design, testing, and refinement, the Institute has validated that women farmers are not passive recipients but active contributors to agricultural innovations. ICAR-CIWA has developed and validated a wide range of women-friendly tools, implements, and machines aimed at reducing drudgery, improving efficiency, enhancing safety, and increasing productivity across agricultural operations. Key innovations include pedal operated women-friendly coconut dehusker, power-operated groundnut stripper-cum-decorticator, improved manual disc ridger, easy harvester bag, women-friendly nursery tools, women friendly integrated vertical nutri-farming system for vegetable production with mushroom and poultry, women friendly rotary goat feeding system, ergonomic refined fish descaler, head-load management device, etc. Additionally, process of fermented fish silage manure, azolla-based poultry feed, green fodder incorporated animal feed concentrate, and weed based bio-input had been developed to support low-input farming. A wide range of food based processes and value-added product formulations had also been developed for therapeutic purposes, along with plant based textile related process technologies and protective clothing designs, contributing to nutrition, health, drudgery reduction, and livelihood enhancement for farm women.

ICAR-CIWA has made significant contributions in developing and demonstrating gender-responsive extension models and methodologies, namely 'Gender Responsive Integrated Homestead Aqua-horticulture Model (GRIHA)', 'Gender Sensitive Agri-Nutri Farming System Model (GSAN)', 'Sustainable She-preneurship in Mushroom Cultivation Model (2S2M)', 'Gender-Sensitive Community-based Agripreneurship Model through Livestock and Fisheries Technologies (GCAM)', 'Gender Sensitive Village Level Para Extension Worker Model (VPEW)', 'Family Poultry Production Model for Nutrition and Income', 'Gender-Sensitive Model for Doubling Farmers' Income', 'Gender Responsive Climate Smart Agriculture Framework', 'Multi Agency Participatory Extension Model for Sustainable backyard poultry (MAPEM)', 'Gender-Sensitive Extension Model for addressing Livelihood, Nutrition and Entrepreneurship (GSEM)', and Gender Responsive Climate Smart Agriculture Framework', 'Multi-storey and intercropping horticulture models', Gender-Inclusive approaches for Community Mango Orchards', JANANI Nutri-Garden Model, etc. All these models are primarily focusing on equity, location specific but scalable and address intersectional constraints related to access, skills, time constraints, and social norms, addressing SDG 5 (Gender Equality) along with SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and well-being), and SDG 13 (Climate Action). Together, these models demonstrated how gender-responsive package of practices and extension approaches can strengthen livelihoods, improve household nutrition, build climate resilience, and contribute to inclusive and sustainable agri-food systems.

The Checklists for assessing gender responsiveness of agricultural technologies and methodology for Livestock Farmers Livelihood Vulnerability Index (LLVI) are tools to enable researchers, extension professionals, and planners to systematically assess gender gaps, identifying root causes and accordingly guide for technologies development, programme design and evaluation.

There are deep rooted gender gaps in access to farm tools and machinery, and most women farmers face financial constraints, which restricts their efficiency and increases drudgery and time constraints. To promote gender equity women farmer interest groups (WFIGs)/ producer collectives (WFPOs/ WFPCs) were formed to facilitate access to credit and subsidies and small-scale women-led custom hiring centres (CHCs) were conceptualized and established in needy villages and communities for better access to farm tools. These initiatives improved productivity, reduced labour burden, facilitated easy marketing, and created local employment and entrepreneurship opportunities for rural women in India.

All these R&D experiences specified that gender equity need to be positioned as core principle with gender-responsive planning, budgeting, implementation, monitoring, and documentation of research and extension milestones to contribute towards achieving gender equality and sustainability in agri-food systems.

The Strong, Robust Start up Ecosystem for Innovations in the Agrifood Systems in India: A Compilation of Strategies

Akriti Sharma
CEO, Pusa Krishi, ICAR-Indian Agricultural Research Institute, New Delhi

India's agrifood systems are increasingly being shaped by innovation-driven entrepreneurship, supported by progressive policies, research institutions, and a rapidly expanding startup ecosystem. Building a strong and robust agrifood startup ecosystem therefore requires well-defined strategies that integrate policy support, institutional incubation, research commercialization, and market linkages to accelerate technology-led transformation in agriculture. In this context, it becomes important to understand the strategic imperative for strengthening the agrifood startup ecosystem in India.

1. Strategic Imperative and Policy Architecture for Agrifood Startup Development

Over the past decade, India has witnessed the emergence of a vibrant agritech startup ecosystem operating across domains such as precision farming, farm mechanization, agri-finance, supply chain optimization, and digital advisory services. These enterprises are addressing critical sectoral challenges including low productivity, fragmented markets, post-harvest losses, and limited access to technology among smallholder farmers. Consequently, the development of a strong and robust agrifood startup ecosystem has become a key pathway for accelerating agricultural modernization and enabling inclusive rural development.

Recognizing this strategic imperative, the Government of India has introduced a range of policy initiatives to promote innovation-driven entrepreneurship in agriculture. Programs such as the Startup India Mission and the Atal Innovation Mission have created a conducive environment for technology-driven startups by improving access to funding, mentorship, and incubation support. Sector-specific initiatives of the Ministry of Agriculture and Farmers Welfare—including the National Mission on Agricultural Extension and Technology, the Agri Infrastructure Fund, and Digital Agriculture initiatives—have further strengthened the enabling ecosystem by facilitating infrastructure development, digital platforms, and institutional partnerships. Together, these policy frameworks aim to lower entry barriers for innovators, promote the commercialization of agricultural technologies, and foster collaboration between startups, research institutions, and industry stakeholders. By aligning national innovation policies with agricultural development priorities, India is steadily creating an ecosystem that encourages researchers, entrepreneurs, and young professionals to develop scalable and impactful agrifood solutions.

2. Institutional Ecosystem for Innovation, Incubation, and Technology Commercialization

Institutional initiatives play a central role in translating policy intent into tangible innovation outcomes. One of the most important strategic interventions in this regard has been the establishment of incubation and acceleration platforms under the Rashtriya Krishi Vikas Yojana – Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR). This initiative has created a nationwide network of 29 agribusiness incubators across leading agricultural institutions. Through structured mechanisms such as idea-stage grants, seed-stage funding, mentoring, and capacity-building programs, the RAFTAAR ecosystem enables early-stage innovators to convert ideas into viable enterprises. Startups supported under the program receive financial assistance at the idea, prototype, and seed stages along with access to expert mentoring, laboratory infrastructure, and market networks. Since its inception, the program has trained more than 6,000 startups and funded 2,282 ventures across the country, thereby contributing to employment generation, technology commercialization, and farmer-centric innovation.

The strength of this incubation ecosystem is further reinforced by India's extensive National Agricultural Research and Education System (NARES), which comprises ICAR institutes, agricultural universities, and allied research organizations. As one of the largest agricultural research networks in the world,

NARES generates a diverse portfolio of technologies related to crop improvement, farm mechanization, post-harvest management, food processing, and digital agriculture. Through structured technology transfer systems, collaborative research programs, and incubation initiatives, these technologies can be translated into scalable agribusiness enterprises. The growing participation of scientists, researchers, and students in entrepreneurship programs has also contributed to fostering an innovation-oriented culture within agricultural research institutions. By aligning scientific research with entrepreneurial opportunities, NARES institutions serve as an important foundation for technology-driven startup development in the agrifood sector.

Institutional incubation platforms such as Pusa Krishi further strengthen this ecosystem by bridging the gap between laboratory innovation and commercial enterprise development. As an agribusiness incubation and entrepreneurship promotion platform, Pusa Krishi provides structured mentoring, technology validation support, business development assistance, and access to advanced research infrastructure. The incubator supports startups across multiple domains including farm mechanization, agri-biotechnology, food processing, digital agriculture, and climate-smart technologies. To date, Pusa Krishi has incubated 605 startups, funded 232 innovations, and facilitated the development of solutions benefiting 3.7 million farmers across various regions. By integrating research expertise with entrepreneurial mentoring and market linkages, the platform demonstrates how institutional incubators can accelerate the commercialization of agricultural technologies while strengthening the broader agrifood innovation ecosystem.

3. Technology and Innovation Strategies Across the Agrifood Value Chain

Strengthening innovation across the agrifood value chain requires a combination of enabling policy frameworks, institutional initiatives, and collaborative ecosystem development. Governments and policy institutions can play a pivotal role by promoting mission-oriented programs that support emerging technologies such as precision agriculture, artificial intelligence–enabled advisory systems, sensor-based irrigation management, autonomous farm machinery, and digital traceability platforms. Dedicated innovation missions, regulatory sandboxes, and targeted funding schemes can accelerate experimentation and commercialization of these technologies while ensuring accessibility for smallholder farmers. Aligning these technological interventions with global priorities such as climate-smart agriculture, resource efficiency, and food security is essential to support the broader objectives of the United Nations Sustainable Development Goals (SDGs), particularly those related to zero hunger, responsible consumption and production, and climate action.

Research and development institutions, including national agricultural research systems and universities, have a critical role in generating next-generation technologies and facilitating their translation into market-ready solutions. By strengthening technology transfer offices, promoting interdisciplinary research, and encouraging researcher–entrepreneur collaborations, R&D institutions can accelerate the conversion of scientific innovations into viable agribusiness ventures. Incubators and innovation platforms can complement these efforts by providing mentoring, prototyping facilities, validation support, and access to pilot testing environments. Such institutional mechanisms help bridge the gap between laboratory innovation and field-level deployment. In addition, global collaborations and knowledge-sharing networks can enable Indian agrifood innovators to access international best practices in digital agriculture, sustainable production systems, and climate-resilient technologies, thereby positioning India as an active contributor to global agrifood innovation ecosystems.

4. Strategies for Strengthening Market Linkages, Investment, and Scaling

For agrifood startups to achieve scale and sustained impact, strengthening market linkages and investment ecosystems is essential. Policy directives can facilitate this by enabling supportive regulatory frameworks, improving access to credit and risk capital, and creating dedicated financial instruments for agritech enterprises. Governments and development finance institutions can encourage blended finance models that combine public funding with private investment, thereby reducing risk for early-stage agrifood innovations. Institutional programs that promote partnerships between startups, farmer producer organizations (FPOs), agribusiness firms, and state agricultural

departments can significantly expand the reach of new technologies and services among farming communities.

Trade promotion bodies and export development agencies also have an important role in connecting agrifood startups to global markets. By facilitating participation in international trade fairs, innovation showcases, and technology partnerships, these institutions can help emerging enterprises integrate into global value chains. Additionally, the development of digital marketplaces, logistics platforms, and export-oriented processing clusters can enable startups to scale their operations while improving market access for farmers. Incubators and ecosystem enablers can further support this process through investor networking platforms, demonstration projects, and field pilots that validate technologies under real farming conditions. Such integrated strategies not only strengthen investment flows but also enhance the credibility and scalability of agrifood innovations within domestic and international markets.

5. Strategic Pathways for a Resilient and Globally Competitive Agrifood Startup Ecosystem

Building a resilient and globally competitive agrifood startup ecosystem requires coordinated action among policymakers, research institutions, incubators, investors, and industry stakeholders. Policy frameworks must focus on long-term ecosystem development by strengthening national incubation networks, promoting public–private partnerships, and ensuring sustained financial support for early-stage innovation. Research institutions can further contribute by aligning research priorities with emerging market needs, fostering entrepreneurship among students and scientists, and establishing structured pathways for technology commercialization through licensing, spin-offs, and startup incubation.

Incubators and innovation platforms play a crucial catalytic role by nurturing early-stage enterprises, facilitating technology validation, and connecting innovators with industry partners and investors. Trade promotion organizations and international collaboration platforms can expand global engagement by linking Indian agrifood startups with international research networks, technology providers, and markets. Such collaborative approaches are essential for positioning India's agrifood innovations within the global innovation landscape while advancing sustainable agricultural development. By leveraging institutional strengths, fostering cross-sector partnerships, and aligning innovation strategies with the Sustainable Development Goals, India can build a dynamic agrifood startup ecosystem that enhances farmer prosperity, strengthens food security, and contributes to sustainable global food systems.

Technical Session VII:
Gender Dynamics in Policy and Market Access

Women-led Agricultural Cooperatives: Improving Market Access and Income Opportunities for Women Farmers - Challenges and Opportunities.

C.P. Devanand
Managing Director, NDDB Dairy Services, Ahmedabad, Gujarat

India's dairy sector represents one of the largest smallholder-based agricultural systems in the world. As the largest milk producer globally, India contributes nearly 25% of the world's milk supply, with production reaching approximately 247.85 million tonnes in 2024-25. Unlike many developed dairy economies that rely on large industrial farms, India's dairy production is driven by nearly 80 million rural households engaged in smallholder dairying and animal husbandry. Within this system, women play a central role in sustaining daily farm operations and maintaining

Women are central to this system, constituting around 70% of the dairy workforce and performing most daily livestock management tasks such as feeding, milking, and animal care. Despite their substantial contribution, women have historically had limited ownership of assets, restricted participation in decision-making, and unequal access to the income generated through dairy activities. Strengthening women's participation in dairy institutions has been shown to significantly improve household welfare, including nutrition, education, healthcare access, and financial stability.

India's dairy cooperative movement has created an important platform for women's participation. Of the approximately 1.72 crore dairy cooperative members nationwide, nearly 60 lakh (about 35%) are women, and around 53,000 village-level dairy cooperative societies are exclusively women-run, representing roughly 23% of all societies. These figures highlight the growing institutional role of women within the dairy value chain.

A major institutional model supporting women's empowerment in dairying is implemented by NDDB Dairy Services (NDS), the wholly-owned, not-for-profit delivery arm of the National Dairy Development Board (NDDB). NDS focuses on building a sustainable and inclusive dairy ecosystem through two key pillars: institution building and productivity enhancement. Under the institution building framework, NDS promotes Milk Producer Organisations (MPOs)- farmer owned enterprises that combine the cooperative ethos with professional management and modern governance systems.

As of FY 2024-25, NDS supports 25 operational MPOs across 12 states, covering more than 35,000 villages and engaging approximately one million women members. These organisations operate on principles of transparency, technology integration, professional management, and farmer ownership, with a strong focus on women's participation and leadership. The model aligns with the Government of India's broader vision of strengthening farmer institutions and promoting rural economic self-reliance.

A distinctive feature of the NDS approach is its structured pathway for women's leadership development. Women farmers progress from milk entrepreneurs at the farm level to cooperative members, operational roles within dairy institutions, management committee members, and eventually board-level leaders in MPOs. This progression is designed to transform the sector from "Women in Dairying," where women primarily contribute labour, to "Women-Led Dairying," where women actively own, govern, and lead dairy enterprises.

Women's participation within NDS supported MPOs is significant. Women represent 77% of total farmer members, and 18 of the 25 MPOs are governed entirely by women. Women also hold 84% of board director positions and have collectively contributed Rs. 254.4 crore as share capital, demonstrating their role as equity investors and institutional owners rather than programme beneficiaries.

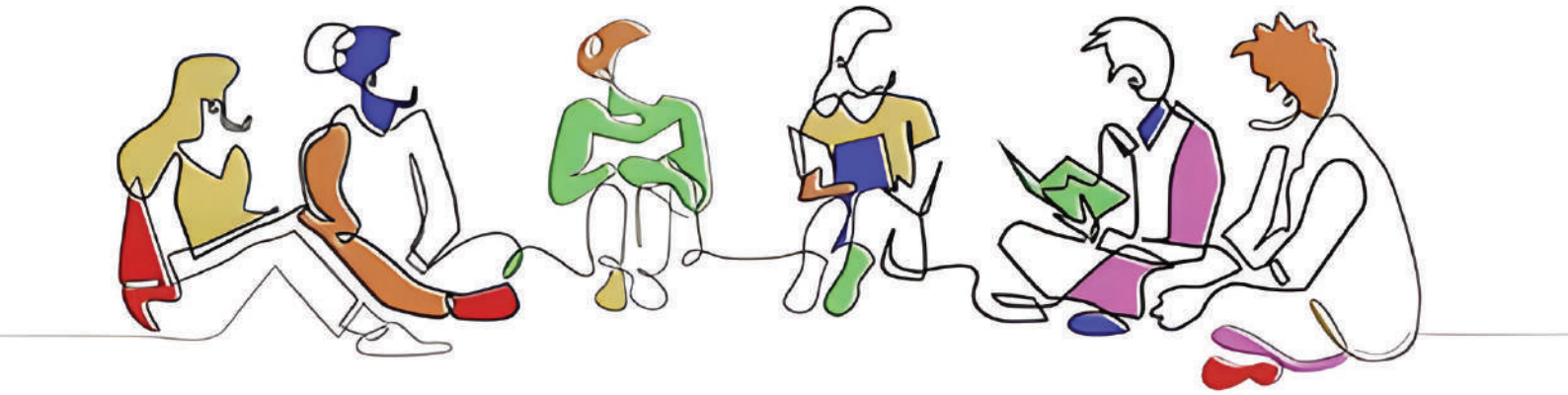
The economic impact is reflected in the emergence

of 1.5 lakh "Lakhpati Didis", women farmers earning more than Rs.1 lakh annually from dairy and allied activities. Beyond income growth, MPO participation has strengthened household resilience. Many women farmers have reinvested earnings in livestock, housing improvements, and productive equipment, while also reporting improvements in savings, household decision making, healthcare access, and children's education.

Despite this progress, several structural challenges remain. These include digital literacy gaps, limited functional literacy, lack of asset ownership, restricted access to formal credit, social barriers to leadership, and mobility constraints that limit women's participation in markets, training programmes, and governance structures.

Looking ahead, NDDB and NDS aim to accelerate the transition toward women-led dairying by focusing on technology adoption, leadership development, labour-saving innovations, improved asset ownership for women, expanded credit access, and enhanced nutritional security. The long-term vision is to build a resilient, inclusive, and sustainable dairy sector driven by empowered women entrepreneurs who lead institutions, markets, and value chains across rural India.

Youth Forum



GLOBAL CONFERENCE ON WOMEN IN AGRI-FOOD SYSTEMS (GCWAS-2026)

Driving Progress, Attaining New Heights

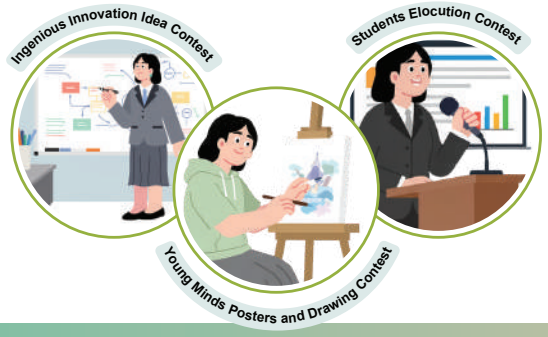
TECHNICAL SESSION IX

Youth Forum

NURTURING NEXT GENERATION OF AGRI-FOOD LEADERS

Designed as a dynamic platform, Youth Forum serves as a vibrant space where young minds come together to reimagine the future of agriculture and food systems. It aims to inspire innovation, strengthen leadership capacity, and encourage meaningful youth participation in the agri-food sector. The forum creates opportunities for dialogue, skill-building, and collaboration across diverse backgrounds. By connecting emerging leaders with industry experts and peers, it fosters practical solutions to today's food security and sustainability challenges. Ultimately, the initiative empowers youth to become confident drivers of transformation in agriculture and beyond.

The GCWAS Youth Forum presents winners from pre-conference contests organized by ICAR-Indian Agricultural Research Institute, New Delhi, India. In addition to that, the two institute innovative women farmer awardees and a young entrepreneur incubated by the institute are also going to showcase their innovative achievements towards agri food systems.



GUIDANCE AND INSPIRATION

Dr. Renu Swaroop
Former Secretary DBT, India
Dr. R S Paroda
Chairperson, TAAS
Dr. Ch. Srinivasa Rao
Director, ICAR-IARI, New Delhi

OVERALL CONVENOR

Dr. Anupama Singh
JD (Education) and Dean

EVENT CONVENORS

Ingenious Innovation Idea Contest
Dr. Akriti Sharma
Dr. Veda Krishnan
Dr. Neelam Upadhyay
Dr. Manisha Mani

Elocution team
Dr. Monika Joshi
Dr. Deeba Kamil
Dr. Aditi Kundu
Dr. Amalendu Ghosh

Posters and Drawings Contest
Dr. Shruti Sethi
Dr. C.Bharadwaj
Dr. Bishnu Maya Bashyal
Dr. Namita
Dr. Sapna Panwar
Dr. Neeraj Patanjali

Organizers

ICAR | taas Progress Through Science | CGIAR SCIENCE FOR A FOOD-SECURE FUTURE | PPVFRA

Ingenious Innovation Idea Contest

The Ingenious Innovation Idea Contest was conceived to catalyze student ingenuity and transform promising ideas into future startups. It was a world wide call for applications from teams led by female students as lead supported by mentors from academia and industry, followed a two stage evaluation. Out of eleven finalist teams, the intense evaluation by jury comprising experts from academia, industry, entrepreneurs culminated in the selection of four outstanding teams, orchestrating a dynamic pipeline of young innovators for the agri-innovation ecosystem. The ideas of winner teams will be supported in diverse ways by Tech Incubator Pusa Krishi of ICAR-IARI.

1. She-Shroom (ICAR-IARI, India): It presents a breakthrough ready-to-deploy mushroom cultivation platform that simplifies production while enabling scalable, women-led protein enterprises.

2. LOWI – Lean On Women (Kenya): It advances a transformative women-centric agri-enterprise model that builds resilient rural livelihoods through decentralized production and collective market power.

3. Ecovion (IIT Roorkee, India): It introduces a smart root-zone nutrient delivery system that can significantly improve fertilizer efficiency, reduce input losses and enhance sustainable farm productivity.

4. Zelbytes Pvt. Ltd. (India): ZelAI-She pioneers an AI-enabled autonomous micro-farming platform that democratizes precision agriculture and empowers women entrepreneurs in small-space farming.

Students Elocution Contest

The National Students Elocution Contest on the theme "Agri-Food Systems of 2050: Youth Perspectives on the Role of Women" was organized for students from universities under the National Agricultural Research, Education and Extension System (NAREES). The two tier contest had first a competition among students from across country at intrazonal level across four zones, at RLBCAU, Jhansi (North); RPCAU, Pusa (East); MPKVV, Parbhani (West); and UAS, Bengaluru (South), in UG and PG/PhD categories. The 15 zonal winners showed their oratory skills in inter zonal contest organised at IARI, New Delhi. The jury comprising senior academia from diverse fields evaluated their performance and selected four winners, two each from UG and PG/PhD categories. The winners are:

UG Category:

- *1st Position: Divanshi Saini (ICAR-IVRI, Izatnagar)- Women-Led Agrifood Systems: Powering Sustainable India 2050*
- *2nd Position: Isha Shreyasi (Bihar Animal Sciences University, Patna)- Empowering Women for Resilient and Food-Secure Futures*

PG/PhD Category:

- *1st Position: Kaustabh Mohanty (ICAR-IARI, New Delhi) From Gender Gap to Growth Engine: Women Transforming Global Agriculture*
- *2nd Position: Keerthana Nayak N (UAS, Bengaluru) Women: From Invisible Backbone to Institutional Leadership*

Young Minds Posters and Drawing Contest

With aim to ignite the young minds at middle and high school levels, about the agri-food systems and role of women, the ICAR-IARI organized Young Minds Posters and Drawing Contest in different schools. The theme was '2050 के कृषि-खाद्य प्रणालियों में महिलाओं की भूमिका पर युवा दृष्टिकोण' (Young Minds Perspective on Role of Women in Agri-Food Systems Towards 2050). Middle school students participated enthusiastically in the drawing competition, while in the posters competition, the high school youth proactively exhibited their vision on the theme with 'Future India and World' in the backdrop of their vibrant thoughts. Two juries of experts in agriculture and allied domains evaluated the entries and selected three winners in each category and also recommended two consolation prizes each. The winners' drawings and posters will be displayed during the conference, and students will be felicitated.

Innovative Entrepreneur Speakers

1. ***Smt. Bharti Bhoria*** *(Kangra, Himachal Pradesh): Technology-Driven Precision Farming Model: She has developed a soil-based precision vertical farming system using IoT automation, modular infrastructure, and organic practices across 3 hectares. She cultivates high-value vegetables, berries, specialty herbs, turmeric, and Kangra tea, creating a scalable, resource-efficient model for small and marginal farmers in hill regions. The model has reduced operational costs by ~75%, increased productivity by ~20%, and saved ~90% land and water. Farm turnover grew from ₹8.9 lakh (2022) to ₹45 lakh (2024–25), projected ₹80 lakh (2025–26), while training 540+ farmers and generating rural employment.*

2. ***Dr. Pooja Gaur*** *(Jaunsar Region, Uttarakhand): Market-Led Cooperative Aggregation Model: She launched the "Market on Wheels" initiative, a mobile aggregation and marketing system supported by a cooperative hub-and-spoke network and warehouse facility to improve market access for tribal farmers. The initiative has generated about ₹90 lakh for farmers, collectively marketed 607 MT tomato and 244 MT capsicum (2025), and engaged ~4,600 women through SHGs and 1,500+ farmers, while promoting sustainable practices such as precision irrigation, rainwater harvesting, and organic waste recycling.*

3. ***Dr. Himani Kaushik, Co-founder Director, Compute Genomics Pvt. Ltd.:*** ***SMART-One™*** *is an innovative NGS analysis technology platform that converts complex genomic sequencing outputs into decision-ready insights for crop and livestock improvement programs. With a biologist-friendly interface, it generates standardized outputs such as sample quality dashboards, curated variant and marker lists, identification of trait-linked genomic regions, and diversity analysis across breeding lines, enabling efficient genomic analysis without requiring heavy computational infrastructure.*

Smt. Bharti Bhoria

Dr. Pooja Gaur

Dr. Himani Kaushik
Co-founder Director,
Compute Genomics Pvt. Ltd.

Farmers' Forum

GLOBALCONFERENCE ON WOMEN IN AGRI-FOOD SYSTEMS (GCWAS-2026)

DRIVING PROGRESS, ATTAINING NEW HEIGHTS

TECHNICAL SESSION VIII

WOMEN FARMERS FORUM

Breaking the Stereotypes

Aim:

Focuses to amplify women farmer's voice, challenge stereotypes, share realities and connect field experiences with policy discussions to strengthen leadership, equity, and development across the Globe.

Objectives:

Women Farmer's Forum will provide a platform to women farmers to showcase their power and voice in shaping the future agri-food system

Highlights:

- Diversified discussions based on their journey of success & life experience.
- From organic farming and eco-friendly pest management to sustainability in action, climate resilience, and collective strength.
- Women-led innovations i.e., transforming lotus stem waste into wealth, adding value in floriculture, unlocking the hidden potential of agri-waste, and reviving millet and traditional rice varieties.
- Beyond dialogue, this forum ignites leadership—transforming awareness into action and cultivate a powerful generation of women leaders who can redefine resilient, self-reliant, and future-ready farming systems.

Outcome

The outcome of the Women Farmers' Forum will be far-reaching and transformational. It will strengthen networks between women farmers ensuring their voices influence policies and development agendas. Ultimately, the forum will create a confident, connected, and empowered community of women leaders driving inclusive, equitable, and future-ready agricultural systems.

TECHNICAL SESSION VIII

WOMEN FARMERS FORUM

Breaking the Stereotypes

ICAR Convention Centre, Delhi

14 March 2026 • 11:00 AM

SPEAKERS

Rikki Foss
Western Australia

Padmashri Sabarmatee Tikki
Odisha, India

Lahari Bai
Madhya Pradesh, India

Amelia Moreira
Mozambique

Savita Malik
Haryana, India

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Uttar Pradesh, India

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Uttar Pradesh, India

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Rajasthan, India

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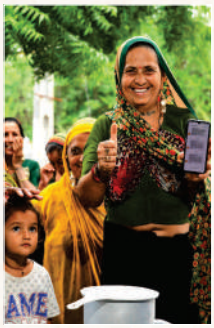


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