



Proceedings of

3rd INTERNATIONAL CONFERENCE

ON

Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)

November 06-08, 2024

ICAR-Central Institute for Women in Agriculture, Bhubaneswar, Odisha, India

Compiled and Edited by

Dr. Mridula Devi

&

Dr. Sukanta Kumar Sarangi

ORGANIZED BY



**PRAGATI INTERNATIONAL
SCIENTIFIC RESEARCH
FOUNDATION, INDIA**



**ICAR-CENTRAL INSTITUTE FOR
WOMEN IN AGRICULTURE (ICAR-
CIWA), BHUBANESWAR, ODISHA, INDIA**

IN COLLABORATION WITH



**Research Association for
Gender in Agriculture (RAGA),
BHUBANESWAR, ODISHA, INDIA**

Proceedings

3rd INTERNATIONAL CONFERENCE

on

**Climate-Smart Nutri-Sensitive Integrated Farming System
for Gender-equitable Sustainable Agriculture: Prospects and
Challenges**

(Hybrid mode)

**Jointly Organized by
ICAR-Central Institute for Women in Agriculture, Bhubaneswar
&
Pragati International Scientific Research Foundation (PISRF),
Meerut, India**

**In Collaboration with
Research Association for Gender in Agriculture (RAGA),
Bhubaneswar**

**at
ICAR-Central Institute for Women in Agriculture (CIWA),
Bhubaneswar, India**

during 06-08 November 2024



November 2024

Acknowledgement

The Organizing Committee of the 3rd International Conference on “Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-Equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)” expresses deep gratitude to all the esteemed participants, distinguished guests, and speakers who have gathered to contribute in this conference. We extend our heartfelt thanks to our Chief Patron, Dr Himanshu Pathak Ji, Secretary DARE & DG, ICAR, New Delhi, Patron, Dr. R.C. Agrawal Ji, DDG (Agril. Education), ICAR-New Delhi, and to our Chief Guest and other dignitaries, whose support has been instrumental in making ICNSFS-2024 a reality.

We are especially grateful to Dr. Mridula Devi, Director, ICAR-Central Institute for Women in Agriculture (ICAR-CIWA), Bhubaneswar, for her visionary leadership and continuous encouragement in organizing this conference. Special thanks to Dr Sanjay Kumar, Chairman, Agricultural Scientists Recruitment Board (ASRB), New Delhi for his support and presence in the conference as Chief Guest during the Valedictory Function. Thanks to ICAR-CIWA team for their tireless efforts and coordination in planning this event.

We also extend our sincere appreciation to our sponsors, collaborators, and volunteers, whose invaluable support and contributions have been integral for the successful organization of ICNSFS-2024. Finally, we acknowledge the contributions of all authors, researchers, and participants, whose presentations and papers enrich the proceedings and provide insightful perspectives on sustainable and equitable farming systems.

*Organizing Committee
ICNSFS-2024*

Preface

The 3rd International Conference on “Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-Equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)” brings together a diverse assembly of researchers, policymakers, scientists, and practitioners from around the globe to address the pressing issues facing modern agriculture. This conference held from November 06-08, 2024, at ICAR-Central Institute for Women in Agriculture (ICAR-CIWA), Bhubaneswar (Odisha), offers a unique platform to discuss, deliberate, and discover innovative solutions that integrate climate resilience, nutritional security, and gender equity within the agricultural sector.

As climate change increasingly impacts agricultural productivity and food security, this conference underscores the need for adaptive, climate-smart and interdisciplinary solutions that go beyond traditional approaches. By focusing on nutri-sensitive integrated farming systems, ICNSFS-2024 aims to enhance our understanding of sustainable agricultural practices that are not only environmentally sound but also nutritionally enriching and inclusive. A particular emphasis on gender-equitable approaches reflects our commitment to empowering women in agriculture and promoting social and economic resilience in rural communities.

This compilation of proceedings represents the efforts, expertise, and vision of many contributors who share a commitment to transform agriculture for a more sustainable and inclusive future. We hope that ICNSFS-2024 will stimulate further research, collaboration, and action in achieving climate-smart, nutritionally sensitive, and equitable farming systems worldwide.

*Organizing Committee
ICNSFS-2024*

Proceedings of the International Conference titled “Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)”

The International Conference on **Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture**, has been organized jointly by ICAR-Central Institute for Women in Agriculture (ICAR-CIWA), Bhubaneswar and Pragati International Scientific Research Foundation (PISRF), Meerut, India in Collaboration with: Research Association for Gender in Agriculture (RAGA), Bhubaneswar.

In total there were 146 papers were presented under 10 themes in 14 technical sessions. This includes 121 oral presentations, 14 lead lecture presentations and 8 key note speaker presentations. There was participation from 22 states of India and four countries including India.

Inaugural Session

The 3rd International Conference on ‘Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)’ was inaugurated on 06 November 2024 by Dr. R. C. Agrawal, Hon'ble Dy. Director General, (Agriculture Education), Indian Council of Agricultural Research, New Delhi as Chief Guest at ICAR-Central Institute for Women in Agriculture, Bhubaneswar. Dr. R. C. Agrawal, in his inaugural speech stressed upon for the vital contributions of women farmers in agricultural production and value addition. He also stated the need for gender equity to achieve sustainable agricultural development. He stressed that the participation of girl students in agricultural education is increasing rapidly. He pointed out that women farmers are the main conservators of biodiversity, therefore, they should be recognized and rewarded for this. This Conference aspires to generate insights and promote collaborative strategies to enhance the resilience and gender equity of agricultural systems, contribute valuable perspectives and shaping the trajectory of sustainable agriculture globally. About 300 delegates from across India and abroad are participating in this conference in different technical sessions. This conference provides a platform for interdisciplinary dialogue on critical issues shaping the future of agriculture by exploring sustainable practices and challenges within Climate-Smart Agriculture, Integrated Nutrient Management, Gender-Inclusive Agricultural Extension, Agricultural Mechanization, Horticulture, Animal Husbandry, Artificial Intelligence, and Gender Equity. Each theme encompasses specific sub-themes, such as innovative nutrient-sensitive crop integration, gender-responsive extension services, and advanced technologies in artificial intelligence for precision agriculture. The conference aims to foster knowledge exchange, addressing challenges like gender disparities, technological advancements, and sustainable practices. It aspires to generate insights and promote collaborative strategies to enhance the resilience and gender equity of agricultural

systems. This academic gathering is poised to contribute valuable perspectives, shaping the trajectory of sustainable agriculture globally.

In the inaugural session, the contributions of women farmers to agriculture and allied sectors were recognized by felicitating successful women farmers by Chief Guest Dr. R.C. Agrawal. Students, researchers and academicians were also recognized for their contribution towards agricultural research and education. Dr. Praveen Kumar Singh, Hon'ble Agriculture Commissioner Department of Agriculture & Farmers Welfare, New Delhi wished that this conference will provide a platform to achieve sustainable development goals by addressing the several challenges and institutional bottlenecks. Dr. P. K. Roul, Hon'ble Vice-Chancellor, Odisha University of Agriculture & Technology, Bhubaneswar highlighted the importance of diverse nutrient-rich food to meet the increasing demand of burgeoning population and advocated the need of climate-smart agricultural practices to combat the adverse effects of climate change for sustainable agriculture. Dr. Gaya Prasad, Former Vice Chancellor, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut and Chairperson of this conference emphasized on the challenges of Agri-food system and role of the women farmers in Indian agriculture. He also emphasized the need to address gender issues in agriculture and allied sectors for adaptation to climate change at regional, national, and global scales. Dr. Mridula Devi, Director of ICAR-CIWA & Chief Organizing Secretary, emphasized the importance of the conference in achieving sustainable gender-equitable agriculture. She also highlighted the role of ICAR-CIWA in empowering women in the agricultural sector. Dr. K.P. Singh, ADG (Farm Engineering) stressed the importance of agricultural mechanization for smallholder farmers and the need for the development of gender neutral farm machineries.



Lighting of Lamp by the dignitaries during the Inaugural Session of the International Conference

The conference focused on critical themes in sustainable agriculture, addressing pressing issues in climate adaptation, gender equity, nutrition security, and technology. This interdisciplinary platform fostered dialogue on sustainable practices and explored emerging challenges. The goal was to generate insights and recommendations to strengthen agricultural resilience and promote gender-equitable practices globally.



Release of publications by the dignitaries during the Inaugural Session of the International Conference



Awards given to successful Women Farmers during the Inaugural Session of the International Conference

There were 3 plenary lectures, one delivered by Dr. R. C. Agrawal on Fostering Women Empowerment through Skill Development, second lecture was delivered by Prof. Richard Bell, Professor, Murdoch University, Australia on Conservation Agriculture and Mechanisation for Smallholders and third one by Dr. Bramhadev Pattnaik, Former Director of FMD International Centre, on Animal and One Health.

1. Fostering Women Empowerment through Skill Development by Dr. R. C. Agrawal
Empower women in agriculture through targeted skill programs, sustainable employment opportunities, and leadership development. Partnerships with NGOs and private sectors can support economic independence, enhancing women's influence in agricultural decision-making and value chains.



**Address by Dr. R. C. Agrawal, Hon'ble Dy. Director General, (Agriculture Education),
Indian ICAR, New Delhi as Chief Guest**

2. Conservation Agriculture and Mechanisation for Smallholders Prof. Richard Bell, Professor, Murdoch University, Australia
Promote conservation practices and mechanization to boost productivity and environmental sustainability for smallholders. Access to affordable, gender-friendly tools and minimal tillage techniques can improve soil health, reduce labor, and increase agricultural efficiency.

3. Animal and One Health by Dr. Bramhadev Pattnaik, Former Director of FMD International Centre, Institute of Veterinary Science & Animal Husbandry, SOA University, Bhubaneswar, Odisha
Implement "One Health" principles in animal husbandry to protect human, animal, and ecosystem health. Preventive measures, disease monitoring, and community education are essential for integrated health management, benefiting rural communities and fostering resilient ecosystems.

Agricultural Exhibition

During the conference period (06-08 November 2024), an exhibition on different aspects of integrated farming system was held with participation of various stakeholders such as ICAR institutions (ICAR-CRRI, ICAR-IIWM, ICAR-CTCRI (RC, Bhubaneswar), Agricultural University (Odisha University of Agriculture and Technology, Bhubaneswar), Krishi Vigyan Kendras, NGOs, private agricultural input companies, farmers cooperatives (IFFCO), farmer producer companies, federations (OMFED), farmers interest groups, women producer groups etc. After the inauguration of the conference, the exhibition was inaugurated by Dr. R.C. Agarwal, DDG(Agricultural Education), ICAR, New Delhi. Farmers were given a platform to interact with these organization and agencies and get benefit with the interactions.



Agricultural Exhibition

Proceedings of Technical Session I

Mechanization for Management of Agriculture System (Part 1)

Date: November 07, 2024

Time: 11:30–14:30h

Venue: Sashakti Conference Hall

Session Theme: Mechanization for Management of Agriculture System (Part1)

The first technical session of the 3rd International Conference on "Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-Equitable Sustainable Agriculture: Prospects and Challenges" commenced at 14:30 on November 6, 2024. The session focused on advancements in gender-friendly mechanization and its role in reducing drudgery, improving productivity, and promoting sustainable practices in agriculture. The session was chaired by Dr. K. P. Singh, ADG (Farm Engineering), ICAR, New Delhi, and co-chaired by Dr.

Arumuganathan, Principal Scientist at ICAR-Sugarcane Breeding Institute, Coimbatore. Dr. Vijay Kumar, Scientist at ICAR-Central Institute of Agricultural Engineering, Bhopal, served as the rapporteur.

Keynote Address:

Title: Innovation for Gender Friendly Smart Mechanization and Energy Efficiency in Agriculture

Speaker: Dr. K. P. Singh, ADG (Farm Engineering), ICAR

Dr. Singh presented the keynote lecture, emphasizing the importance of developing and implementing women-friendly agricultural machinery to enhance productivity and reduce labor-intensive tasks. His talk highlighted how appropriate mechanization could alleviate occupational health hazards faced by female agricultural workers and contribute to gender equity in agriculture. He discussed existing gaps in the availability of gender-friendly machines and encouraged innovation to bridge these gaps, especially in rural areas where women form a significant portion of the agricultural labor force.

Lead Lecture:

Title: Technology Demonstration of Agricultural Sprayer Drone for Input Management in Sugarcane Crop in Ariyalur District, Tamil Nadu

Speaker: Dr. T. Arumuganathan, Principal Scientist, ICAR-Sugarcane Breeding Institute

Dr. Arumuganathan presented an insightful lecture on the use of agricultural drones for input management in sugarcane fields, with a case study from Tamil Nadu. The drone technology for spraying fertilizers and pesticides was demonstrated as an efficient solution for labor shortages and uneven application. He highlighted the potential for drones to reduce input costs, increase precision, and mitigate health risks associated with manual pesticide application, particularly benefiting women in agricultural labor.

Oral Presentations:

1. Tractor Drawn Transplanter for Onion Seedlings Presenter: Dr. Ajit Magar

Dr. Magar discussed the development of a tractor-drawn transplanter designed for onion seedlings. This mechanization innovation aims to reduce labor and improve planting accuracy, offering a significant improvement over traditional manual methods.

2. Food Processing Technologies for Women Entrepreneurs: Way Forward for the Future of the Food Processing Sector

Presenter: Dr. Sandeep Popatrao Dawange

Dr. Dawange emphasized the role of food processing technology in empowering women entrepreneurs. His presentation showcased how mechanization can reduce drudgery and provide economic opportunities for women, especially in value-added food product sectors.

3. Simulation and Modelling of a Residue Management Machine: A Discrete Element Method Approach

Presenter: Dr. Abhishek Patel

Dr. Patel presented a model for a residue management machine using a Discrete Element Method (DEM) approach. This technology addresses residue burning, a significant environmental issue, by providing a sustainable alternative for managing crop residues.

4. Quantifying the Drudgery in Rice Cultivation: A Time & Motion Study Presenter: Er. Chaitrali S. Mhatre

Er. Mhatre shared findings from a time and motion study that quantified the drudgery associated with rice cultivation, underscoring the physical toll on workers, particularly women, and highlighting areas where mechanization could alleviate labor demands.

5. Design and Development of Tractor-Operated Plastic Mulch Layer-Cum-Planter

Presenter: Dr. Chetan Kumar Sawant

Dr. Sawant showcased a tractor-operated machine designed to lay plastic mulch and plant seeds simultaneously. This technology optimizes resource use and labor while enhancing crop yield.

6. Development and Evaluation of a Sensing Device for Monitoring Spoilage in Pearl Millet Grains

Presenter: Dr. Shilpa S. Selvan

Dr. Selvan discussed a device to monitor spoilage in stored pearl millet grains, which aims to reduce post-harvest losses and improve food security.

7. Occupational Health Issues among Female Agricultural Workers during Paddy Transplanting

Presenter: Dr. Sweeti Kumari

Dr. Kumari's research highlighted the health challenges faced by women during paddy transplanting. Her study stressed the need for ergonomic tools and mechanization to improve health outcomes.

8. Valorization of Underutilized Himalayan Grains for Functional Food Presenter: Dr. Nilakshi Chauhan

Dr. Chauhan discussed the potential of underutilized Himalayan grains in developing functional foods, contributing to biodiversity conservation and nutritional security.

9. Enhancing Quality of Coriander Leaves with Vacuum Impregnation Technology Presenter: Dr. Aseeya Wahid

Dr. Wahid presented the vacuum impregnation technique to improve the quality of coriander leaves, offering a preservation method that can benefit small-scale processors.

Conclusion

The session showcased a wide range of mechanization technologies aimed at improving productivity, reducing drudgery, and promoting sustainability in agriculture, especially for women. Each presentation highlighted innovative approaches to address critical issues in agriculture and food processing, aligning with the conference's theme of climate-smart, nutritious, and gender-equitable agriculture.

Proceedings of Technical Session II:

Horticultural Practices for Climate-Resilient Agriculture Production

The session was chaired by Dr M. Mainuddin, Principal Research Scientist, CSIRO, Australia and Co-Chaired by Dr. S.K. Sarangi, Head, Division of Agricultural Technologies for Women, ICAR-Central Institute for Women in Agriculture, Bhubaneswar, Odisha, India. Rapporteur of the session was Dr. Ankita Sahu, Scientist (Fruit Crops), ICAR-CIWA.

Lead Lecture: Cropping system intensification to enhance food and nutrition security, and improve livelihoods in the salt-affected coastal regions of the Ganges Delta

Recommendations: Adoption of diversified cropping systems can enhance resilience and productivity in the saline-prone areas of the Ganges Delta. Integration of soil management practices and efficient water use can improve soil health and mitigate the impacts of salinity on agricultural output.

Presentation 1: Synchronizing Sustainable Systems: Integrating Kitchen Gardens and Livestock in Climate-Smart IFS.

Recommendation: Integration of climate-resilient kitchen gardens with livestock management can enhance soil fertility, and provide diversified income sources in climate-smart Integrated Farming Systems (IFS).

Presentation 2: Organic horticultural farming through the lens of gender: Participation, roles and empowerment of farm women

Recommendation: Farm women play a significant role in organic management practices. In horticultural production, organic farming can be a potential area for women farmers to establish entrepreneurship. A gender-responsive approach should critically assess gender-based roles and constraints, and implement strategies aimed at empowering women

Presentation 3: Impact of Women Friendly Integrated Vertical Nutri-farming System (IVNFS) on Household Nutrition

Recommendation: Women Friendly Integrated Vertical Nutri-farming System can improve access of farm women to affordable, climate-resilient agricultural technologies and resources, enabling them to enhance food security, income generation, and nutritional outcomes for their families.

Presentation 4: Precision farming in banana with fertigation

Recommendation: Precision farming techniques combined with fertigation can optimize nutrient delivery, improve banana crop yields, and reduce fertilizer wastage by applying nutrients directly to the root zone based on real-time soil and plant needs.

Presentation 5: Leaf propagation in guava var. Lucknow 49 and Lalit

Leaf propagation techniques, such as leaf cuttings with rooting hormones, can enhance the propagation efficiency of guava varieties like Lucknow 49 and Lalit, ensuring faster growth and uniformity in planting. Farm women can be trained on proper leaf selection, handling, and environmental conditions (humidity, temperature) to improve the success rates of leaf propagation and maintain high-quality guava production.

6: Screening of F1 for bacterial wilt resistance in eggplant (*Solanum melongena* L.)

Recommendation: Integrating molecular markers and phenotypic evaluation to identify and select F1 lines with enhanced resistance to bacterial wilt will ensure the development of more resilient and high-yielding eggplant cultivars.

Presentation 7: Diversity Analysis of Eggplant Genotypes Using SSR Molecular Markers

Recommendation: Utilization of SSR (Simple Sequence Repeat) molecular markers to assess the genetic diversity of eggplant genotypes can enable in identifying unique traits and variations that can be leveraged for breeding programs aimed at improving disease resistance, yield, and quality.

Presentation 8: Harnessing Nanotechnology: Enhancing the Nutritional Quality of Okra Through Nano DAP

Recommendation: Nano DAP (Diammonium Phosphate) as a controlled-release fertilizer in okra cultivation can enhance nutrient uptake, improve soil health, and increase the quality of the harvested produce. It can also reduce fibre content and improve tenderness in okra along with organoleptic characteristics.



Presentations in Technical Session II

Proceedings of Technical Session III

Gender –transformative approaches in agricultural research and education

Chairperson: Dr. Gayatri Tiwari, Prof. & Sr. scientist, MPUAT, Udaipur, Rajasthan

Co-chairperson: Dr. Kalpana B., Sr. Scientist & Head

Lead lecture: 1, Offline Presentation: 5 and Online Presentation: 7

Recommendations:

1. To reduce gender gap, gap between knowledge and practice should be reduced. For this sensitization of whole community i.e., family is required. So, empower women for thought, feelings and actions.
2. Millets consumption pattern and utilization by farm women of Karnataka state. Throws light on increase in the area of millet cultivation for ensuring food and nutritional security for attaining zero hunger by 2030.
3. Women's relative participation in agriculture increasing over last 6 years.
4. Women as water manager & plays a significant role.

5. Journey of women agripreneurs in Punjab; personal, social and environmental challenges faced by the women entrepreneurs as well as females succeeded in fruit and vegetables processing ventures.
6. Psychological wellbeing is a foundation element for pregnancy outcomes, maternal behaviour and long term physical and emotional wealth.
7. Social participation and information seeking behaviour of women farmers in Karnataka state and found that women farmers sought information majorly through family members (83.75%) and neighbours.
8. Majority of the decision in agriculture and allied activities, purchase of assets, home related decision were taken jointly by man and women indicating the development of the social status of the farming women.
9. Tribal adolescent girls of Udaipur district of Rajasthan lack adequate knowledge of healthy diets, balanced nutrition and superfood.



Presentations in Technical Session III

Proceedings of Technical Session IV

Mechanization for Management of Agriculture System (Part 2)

The session was chaired by Dr. Laxmikanta Nayak, ICAR-National Institute of Natural Fibre Engineering and Technology, Kolkata, West Bengal, Co-Chaired by Dr. Satish Chandra Sharma, Pr. Scientist, ICAR-NISA, Ranchi, Jharkhand and the Rapporteur was Dr. Ajit Magar, Sr. Scientist, ICAR-CIAE, Bhopal.

There was one keynote lecture delivered by Dr. Laxmikanta Nayak on Role of women in entrepreneurship development in jute & allied fibre sector

- Apart from above, there were 12 contributory presentations among which 5 were physical and 5 participants presented through online mode. Contributory presentations

were evaluated and following presentations were selected as per their merit (content, presentations and interactions):

Dr. L.K. Nayak in his keynote lecture, showed a video on the scope and prospects for women entrepreneurs involved in jute & allied fibre sector cultivation and value addition through which they can increase their family income. He deliberated about the role of women in entrepreneurship development in jute & allied fibre sector which will help in livelihood security of farm women.

Contributory lectures delivered by physical as well as online participants deliberated on relation of Seed Storage bags from Jute/Cotton (JuCo) union fabric for paddy; Nanotechnology Applications For Efficient Animal Welfare And Sustainable Farm Management; Effect of Tapping Techniques on Gum Yield from Buchanania lanzan Trees ;Drudgery reduction of farm women through women friendly technologies such Aaram seat and other tools and implements used for paddy, vegetable, millets and Kokcheng for Arecanut cultivation; Production of Functional Low Alcoholic Beverage from Cashew Apple Powder; Innovative Soybean Processing: From Dietary Fiber to Fortified Fermented Products etc.

Their recommendations are given below:

1. Gender friendly, ergonomically designed, light weight portable tools and equipment should be developed for agricultural production.
2. Battery supported equipment should be given preference in the area where electricity is a concern.
3. Tools and equipment developed for crop production should be validated and disseminated through AICRP projects for wider adoption.



Presentations in Technical Session IV

Proceedings of Technical Session V

Technical Session V was focused on Renewable Energy Technology for Gender Equity and Environmental Sustainability, use of renewable sources in production agriculture and agro-processing energy management, rural household, and policy framework. The session was co-chaired by Dr. Ravikant V. Adake, Principal Scientist, ICAR-CRIDA, Hyderabad. Seven presentations were presented in this session, of which 3 were online and 4 were offline.

Offline presentation

Dr. Manisha Jagadale, presented her work on utilization of Okra and Pineapple Residues for generation of bio-fuel emphasizing on the need to generate wealth from waste. Dr. Ravikant V. Adake presented the utilization of Renewable for Small Farm Mechanization in India and enlisted the solar powered machinery developed by him. Dr. Smrutirekha Mallick discussed her work on Recombinant antigen and monoclonal antibody-based solid phase competitive ELISA to detect FMDV serotype O-specific antibodies. She stated her journey on isolation of virus and the mapping process. Mr. Sudhanshu Mishra, presented his work on climate SMART technology for sustainable production. He gave highlights of use of direct seeded rice and how it alleviates the drudgery involved in transplanted rice.

Online presentation:

Dr. Nand Kishore shared his findings on Enhancing Farm Productivity and Energy Efficiency through Agri-Voltaic Systems in Arid Regions of western Rajasthan. He detailed the experiment conducted using various combinations of solar panels and vegetation and its effect thereupon. Dr. Ankur Nagori presented on Experimental investigation of Refrigeration Waste Heat Assisted Hybrid Solar Drying System for Vegetables. He emphasized on how the

use of the heat energy that is going to waste be channeled for useful work. Er. Subhadeep Mukhuty shared findings on Battery-Operated Power Weeding Machines.

Co-Chairperson's Recommendation:

I. GoI has framework, policies and measures for upscaling the use and adaptation of solar energy based farming technology and electricity generation. Holistic approach is required to promote solar farming technique in particular for rain fed agro ecosystem. Package of practices like rain water harvesting farm pond generation, solar power and solar power based farm mechanization may be incentivized to cater to the need of small farm holders particularly in rain fed agriculture.

II. Many of presentations are well justified to the theme of the session. Many renewable energy technologies are now well proven at research level. However more extension activities are required to propagate these technologies at farmers field level. So separate extension wing may be created to upscale the use of solar power and solar power centric technologies



Presentations in Technical Session V

Proceedings of Technical Session VI

Technical Session 6 centered on the theme of Gender-Responsive Climate-Smart Technologies for Sustainable Production, with a focus on addressing climate-adaptive practices through a gender-inclusive approach. Key sub-themes included climate-adaptive nutrient management, gender-responsive conservation agriculture, and climate-smart pest and disease management, all vital for sustainable productivity. The discussions emphasized the

need for equitable resource management to encourage technology adoption among women farmers, enhancing their role in climate-resilient agriculture.

Offline presentations started with an innovative, integrated rice-fish-duck-goatery-azolla-horticulture system, aimed at improving productivity and nutritional security for small-scale farmers in eastern India. This organically managed system combines various farming elements to optimize land use, enhance soil fertility, control pests naturally, and diversify income sources. Participants highlighted the potential of this system to support sustainable livelihoods and food security in resource-limited areas, particularly benefiting small farmers. Another focal topic was the resilience of women potato farmers to climate change. The session underscored the unique challenges faced by women in agriculture, advocating for targeted training in climate-smart techniques. Recommendations included the adoption of improved seed varieties, water-efficient practices, and pest management methods that enhance crop resilience and yield stability. The importance of climate-smart homestead aquaculture was also highlighted, with particular attention on empowering women to participate in backyard aquaculture systems. These low-cost, high-impact systems provide nutritional security and supplementary income, especially when managed by women at the household level.

Online presentations of the session explored research on the effects of elevated CO₂ levels on the biochemical profile of the rice leaf folder (*Cnaphalocrocis medinalis*), a major pest in rice cultivation. Findings indicated that higher CO₂ concentrations could alter rice plant composition, potentially increasing pest resistance and impacting rice yields. Eco-friendly management techniques for root-knot nematodes (*Meloidogyne incognita*) in okra were also discussed, showcasing natural bio-control agents and organic amendments as effective alternatives to chemical pesticides, supporting both pest control and soil health. The session concluded with an exploration of the 5P Model—People, Planet, Prosperity, Peace, and Partnership—as a framework for building food system resilience in tribal communities. This model addresses the 4 Cs (Climate, Crop, Community, and Capacity), promoting sustainable livelihoods through agroforestry, traditional crop practices, and water management. By empowering tribal communities, this approach aims to improve food security, ecological stability, and socio-economic resilience under changing climate conditions. Collectively, these discussions reinforced the importance of inclusive, sustainable agricultural practices to strengthen resilience and ensure food security in vulnerable communities.



Presentations in Technical Session VI

Proceedings of Technical Session VII

Animal Husbandry and Aquaculture for Sustainable Livestock and Fish Production and Women Empowerment (Part 1)

Session revolved around role of animal health and strategies to address one health approach

Keynote Speaker: “Boosting livestock production through better health” –

Recommendation: A comprehensive vaccination program, precision health monitoring, and effective vector control are essential for promoting healthier animal production, improving animal welfare, and ensuring sustainable farm productivity.

Lead Lecture (online): Nano Revolution in Veterinary Medicine: Bridging One Health Gap

She discussed the use of smart drug delivery systems powered by nanotechnology, which enable targeted, controlled, and efficient delivery of medications.

8 offline oral presentations no online oral presentation.

Recommendations:

- Integrating multiple interventions on climate-resilient dairy farming like adaptability of women farmers can be improved significantly. Addressing both animal health and nutritional needs together can be more effective than offering a single intervention, as it provides a holistic approach to enhancing farm resilience.
- Small ruminants, such as sheep and goats, are often asymptomatic carriers of Foot and Mouth Disease (FMD), which increases the risk of disease transmission when housed with large ruminants or healthy animals. Conducting serosurveillance is crucial for detecting these carriers and preventing disease outbreaks. By identifying asymptomatic animals, farmers can take timely measures to control disease spread.

- Routine antibiotic sensitivity and resistance testing is essential for improving treatment effectiveness and minimizing antibiotic resistance, which is critical for sustainable animal production practices.

Slaughterhouse surveillance for FMD should be a standard practice to monitor and control outbreaks. This helps prevent the global spread of the disease while also supporting the One Health approach, which emphasizes the interconnection between human, animal, and environmental health. By addressing these issues comprehensively, farmers can improve both animal health and farm productivity.



Presentations in Technical Session VII

Proceedings of Technical Session VIII

Nutri-sensitive approaches for gender-equitable sustainable agriculture – (Part-1)

The session was chaired by Dr. A.K. Nayak, Director, ICAR-NRRI, Cuttack and Co-Chaired by Dr. Biswajit Mondal, Pr. Scientist, ICAR-NRRI, Cuttack. There was one keynote lecture delivered by Dr. Nayak and two lead lectures by Dr. Mondal and Dr. GC Acharya, Head, Central Horticultural Experimental Station, Bhubaneswar. Apart from above, there were 10 contributory presentations among which 4 were physical and 6 participants presented through online mode.

Dr. Nayak in his keynote lecture deliberated on equitable involvement of women in agriculture with particular emphasis to integrated farming system. Dr. Mondal in his lead lecture presented distribution pattern of farm machines in Odisha under subsidy scheme with a gender perspective and Dr. GC Acharya deliberated on scope and opportunities of diversification of agri-ecosystem through promotion of underutilized vegetables.

Contributory lectures delivered by physical as well as online participants deliberated on relation of women farmers and nutritional security; biofortification of crops as nutri-smart

approaches; promotion of lesser-known vegetables; nutrition-gardening; entrepreneurial development of Meghalaya women; use of plant leaf proteins to combat malnutrition; etc.

Proceedings of Technical Session IX

Animal Husbandry and Aquaculture for Sustainable Livestock and Fish Production and Women Empowerment (Part 2)

Lead Lecture : “Growth performance of Black Bengal Goats fed Total mixed Ration of varied protein level under hot humid climate in Semi Intensive Farming System”

Recommendations: Development of economic feeding protocols using cheaper and locally available feed resources and popularizing among the farmers will help in realizing better profits in black Bengal goat farming

Presentation 1: Women’s Role in Agriculture and Animal Husbandry: From Ancient India to Modern : Challenges and the Way Forward

Recommendation: As women’s domestic responsibilities like child care is hindering the full-fledged participation of women in livestock sector, policy initiatives should be taken to start on farm child care facilities/onfarm schools

Presentation 2: Animal Husbandry and Aquaculture for Sustainable Livestock and Fish Production

Recommendation : Since access to credit is one of the limiting factors for women in participating in animal husbandry and aquaculture, microfinancing could be thought of as a viable option for improving their access to financial resources

Presentation 3: Molecular characterization and phylogenetic insight of cattle tick *Rhipicephalus microplus* from subtropical mountainous terrain of Meghalaya, India

Recommendation: Since cattle tick is prevalent in the mountainous terrain of Meghalaya, COX 1 gene should be used for identification of the ticks and ITS-1 gene for identification of parasites. Also regular screening and treatment of infected animals are necessary. The management measures like quarantine, avoiding cracks and crevices and disposal of dung to be followed

Presentation 4: Assessing the Vulnerability of Women Livestock farmers to Climate Change through Livestock farmers Livelihood Vulnerability Index (LLVI)

Recommendation: For assessing the vulnerability of livestock farmers, not only exposure but adaptive capacity and sensitivity should also be taken into account.

Presentation 5: Comparative Analysis of Lactation Curve Models and Factors Affecting Milk Yield in Purebred Red Sindhi Dairy Cows

Presentation 6: Extraction of phospholipids from ghee residue (a dairy industry by-product) using green extraction approaches

Recommendation: Extraction of phospholipids from ghee residue using microwave extraction results in extraction of more classes of phospholipids and is a better method than pulsed electric field extraction.

Presentation 7: Community Aquafarming Among Coastal And Tribal Women And Their Success Stories

Recommendation: The documentation of success stories of women on coastal aquaculture and fishprenaership helps in highlighting the contribution of women to the sector and will also help in motivating other rural women.



Presentations in Technical Session IX

Proceedings of Technical Session X

Nutri-Sensitive Approaches for Gender-equitable Sustainable Agriculture (Part 2)

Theme: IVb

The session was chaired by Dr S. K. Sarangi, Head, Division of Agricultural Technologies for Women, ICAR-CIWA, Bhubaneswar and Co Chaired by Dr. Jyoti Nayak, Pr. Scientist, ICAR-CIWA, Bhubaneswar.

Rapporteur: Dr Manisha Jagdale

- There was one keynote lecture delivered Dr S. K. Sarangi on Gender-responsive Homestead Farming Systems for Enhancing Family Income and Nutrition
- There were 9 contributory presentations among which 3 participants presented physically and 3 participants presented through online mode.

In this session wide range of topics such as advances to integrate nutri-sensitive crops and varieties for sustainable nutritional security, gender responsive homestead farming system to enhance family income and nutrition, enhancing gender equality in nutrition, food security and health as well as gender equitable policy interventions were discussed. Through these steps, the theme "Sahi Poshan Desh Roshan" can be translated into tangible actions that empower women, promote nutritional security, and build a foundation for a healthier and more prosperous nation. In this session one lead lecture, 3 offline and 4 online presentations were discussed. Based on discussion following recommendation were drawn:

1. More emphasis should be given on policy intervention to make nutritional's food security of households.
2. Provide farmers with resources and training on cultivating these nutri-sensitive varieties, along with proper post-harvest management to retain nutrient quality.
3. Lot of awareness programme should be conducted in village level to make village free from malnutrition.



Presentations in Technical Session X

Proceedings of Technical Session XI

Technical Session 11 was focused on Integration of Artificial Intelligence in Agriculture for Smart Farming with subtheme on Data-driven decision-making, AI, machine learning, IoT and Robotics. The discussions emphasized the need for efficient resource management through digital technology.

Offline presentation started development of remote-controlled robotic weeder for row crops addressing key challenges such as resource inefficiency, labor shortages, and environmental sustainability. Next presentation was dealt with the application of drones in agriculture. The UAV can be very useful for reducing the drudgery in agriculture particularly benefiting women farmers. The next presentation was dealt with Image processing and Convolutional Neural Networks (CNNs) in jute farming for enhancing crop management and disease detection. Another focal topic was the IoT-enabled soil moisture sensing system through which the farmers can access the soil parameters through mobile device. The next presentation showcased the soil property prediction through algorithms and image pre-processing techniques.

After the offline oral presentation the Key note address on “Scope and Challenges of Small Farm Mechanization” was delivered by the Chairperson of the session Dr. V.P. Chaudhary. The address was focused for smallholder farmers to improve productivity, reduce labor costs, and enhance sustainability by introducing affordable, efficient tools for planting, harvesting, and post-harvest processing through digitalization.

Online presentations of the session explored research on decision support system, digital solutions for women farmers and time series forecasting for data-driven decision-making system. Smart IoT based irrigation scheduling system, Causal analysis for identification of

best production practices for optimal crop yield in rice-wheat cropping system and automation and sensor technology in smart grading of tropical fruits was briefly discussed in this session. The overall fruitful discussion on usage of digital technologies in agriculture, smallholder farmers can increase productivity, reduce costs, enhance sustainability, and improve their market access, ultimately improving their livelihoods and contributing to food security.

Proceedings of Technical Session XII

Sustainable Soil and Water Management and Use of Remote Sensing and GIS in Agriculture

The session was chaired by Dr M. Mainuddin, Principal Research Scientist, CSIRO, Australia and and Co-Chaired by Dr. Ashok Kumar Nayak, Principal Scientist, ICAR-Indian Institute of Water Management, Bhubaneswar, Odisha

Rapporteur: Dr Gayatri Moharana

- There was one keynote lecture delivered by Dr. M. Mainuddin on Experience on Sustainable Soil and Water Management in Coastal Region of the Ganges Delta
- There were two Lead Lectures delivered by Dr. Ashok Kumar Nayak on Implementation of Smart Irrigation Technology for a Minor Canal System and Dr. Ranu Rani Sethi presented on Empowering Women in Tribal Agriculture: Perspectives on Water Management
- There were 7 contributory presentations among which One participant presented physically and 5 participants presented through online mode.
- The Chair person in his Key note address presented his experience on Sustainable Soil and Water Management in Coastal Region of the Ganges Delta. His worked with different NGOs for community water management and focused on understanding interaction soil salinity with surface water, ground water through remote sensing and analysis. Recommended the exact time of sowing to farmers and introduces Ziro tillage potato cultivation with straw mulching, garlic cultivation with straw mulching, drip irrigation, use of low cost pitcher, when and how use fresh saline water with brackish water for different crops. It is possible to grow crops in dry season by soli salinity management.
- The 1st Lead speaker Dr. Ashok Kumar Nayak presented on Implementation of Smart Irrigation Technology for a Minor Canal System. Uses mapping of channels through automation and adopted canal automation framework to effectively regulate canal water sufficiently. They have 12 outlets in the research area located in Nayagarh district. The detail data uploaded on the website of the Institute. He also developed one mobile app for live data to identify location of channels and water flow level.
It is essential to prioritize the cases of water scarcity and with the help of available data from the website and mobile app, the farmers can use canal water for irrigation. This helps in increase in productivity and livelihood security.
- The 2nd Lead speaker Dr. Ranu Rani Sethi presented on Empowering Women in Tribal Agriculture: Perspectives on Water Management. She highlighted about the tribal agriculture, unique characteristics of their traditional farming system, status of bio-diversity, low impact of technology, collective ownership and community efforts. The tribal women face challenges in water management, access to water, gender barriers and water scarcity due to impact of climate change. She also presented a success story reflecting the enhanced productivity through effective water management by tribal women
She recommended for adoption of effective water management techniques which will help in empowering tribal women in agriculture to increase productivity and livelihood security.

- Dr. Ranu Rani Sethi presented her Oral presentation on Enhancing Groundwater Levels through Recharge Structures in Hard Rock Areas. She describe the process and methods for ground water management in hard rock areas which was implemented in Nayagarh district of Odisha. They conducted hydrological analysis and evaluated the water recharge rates. After their technological intervention the water level increased upto 1m. The farmers can use ground water for irrigation by recharging the ground water through hard rock.
- Dr Mukesh Kumar presented on Solar powered IoT-enabled digital flume for open channel flow measurement and recommended for modified design part of panshall flume.
- Dr. Dibakar Ghosh presented on Alleviating Cr toxicity and improving rice productivity in mined regions of Odisha. He recommended for effective irrigation practices with natural farming, organic farming, use of vermin compost etc. with continuous flowing of water. These techniques will help in reducing Cr toxicity and improving rice productivity
- Dr. Taslima Zahan presented 1st topics on Yield Prediction of Lentil Using Sentinel-2 Time Series Data and recommended that the yield of lentil can be produced maximum in vegetative state and by using her developed model the lentil production increased by 24%.
- Dr. Taslima Zahan in her 2nd presentation on Machine Learning Models and Optimization of Nitrogen and Weed Management to Reduce Nitrous Gas Emission and Improve Yield of Strip-planted Wheat. She suggested for Strip-planted method to reduce N₂O gas emission which helps in management of weed in wheat.
- Dr. Bhagya H P presented her topic on Carbon sequestration potential in cashew (*Anacardium occidentale*) plantations. She discussed about biological prosects of Biochar from cotton. She suggested for application of Biochar from cotton plat residues can help in increase in crop yield.

Proceedings of Technical Session XIII

Theme X: Gender Equity for Sustainable Agriculture.

The session was chaired by Dr. Mridula Devi, Director, ICAR-CIWA Bhubaneswar and Co-chaired by Dr. Ranu Rani Sethi, Principal Scientist, ICAR-IIWM, Bhubaneswar. Dr. Harapriya Nayak, Senior Scientist & Head, KVK-Khordha, ICAR-CIFA, Bhubaneswar was the Rapporteur.

Dr. Mridula Devi , Director, ICAR-CIWA Bhubaneswar delivered the Keynote lecture entitled “Empowering Women for Gender Equitable Sustainable Agriculture”.

Dr. Arun Kumar Panda, HoD , GFCS division, ICAR-CIWA, Bhubaneswar delivered the Lead Lecture on “Economic Enabling of Farmwomen Through Integrated Farming System”.

In this session a total of eight presentations two (offline mode) and Six (online mode) was conducted. All the presenters meticulously made their presentations covering the various aspects such as promotion of millet for entrepreneurship development, Livelihood schemes, Sericulture, Kaudi art, Work distribution and gender in Tea garden and Ergonomic evaluation in rice production.

The following Recommendations have been made:

1. Gender disaggregated data need to be created.
2. Gender perspective should be given priority during project planning, execution and implementation process.
3. Need based region specific research to address the gender issues and challenges should be strengthened for sustainability of agriculture.

Proceedings of Technical Session XIV

Sustainable Soil and Water Management and Use of Remote Sensing and GIS in Agriculture

The session was chaired by Dr S. K Sarangi, Head, Division of Agricultural Technologies for Women, ICAR-CIWA Bhubaneswar and and Co-Chaired by Dr Ajit Magar, Sr Scientist, ICAR-CIAE, Bhopal.

Rapporteur: Dr Gayatri Moharana

- This session was the poster presentation in which one is presented offline and 10 posters presented online.
- Ms Anju Rani presented on Antifungal activity of silver Bio-nanoparticles against Black Scurf of Potato caused by *Rhizoctonia solani*. She suggested for application of Bio-nanoparticles in crops and vegetables as it is ecofriendly and farmers can use this method.
- Dr Ketan Dogra presented on Advancing Food Security through Gender-Responsive Extension Services. Described various advances gender responsive strategies such as access to control over resources, decision making power and balanced participation of both the gender will help in Food Security through Gender-Responsive Extension Services
- Ms Ritu Bhall presented on Field-Based Evaluation of Insecticide Strategies for Mitigating the Impact of Fall Armyworm (*Spodoptera frugiperda*) on Sorghum in India. She evaluated different insecticides for pest management and spray control in sorghum, tea plant etc. and compared the effectiveness of treatment.
- Dr Sakshi Paritosh presented on Harvesting Equality: Transforming Gender Roles in Agriculture and Extension Services. She suggested for women oriented skill training, technology demonstrations, workshops, extension services, policy recommendations can help in empowerment of rural women in agriculture
- Dr Rupinder Kaur presented on Drudgery experience of farm women Using a Revolving Milking Stool and Refinement in Revolving Milking Stool to Reduce Drudgery among Dairy Women. She identified drudgery among the women farmers involved in milking activities and refined the Revolving Milking Stool to Reduce Drudgery among Dairy Women of Punjab .
- Ms Priya Gond presented on Study the effect of Spray Coating process parameters on Shelf -life of 'Langra' mango (*Mangifera indica* L.). She suggested that with the coating of CMC, Glycerol and Ethrel the mango can be preserved up to 16 days without affecting the quality
- Dr. Vinutha U Muktamath presented on Determinants of Empowering Farm Women through Azolla Cultivation- A Community based Initiative. She suggested for adoption of azolla cultivation by women which will increase income, increase in milk yield among milch animals, and socioeconomic upliftment of farm women.
- Dr. Surekha Sankangoudar presented on Effectiveness of intervention on Value addition to fish among fisherwomen in Uttara Kannada district of Karnataka state. She recommended for value addition of fish which may adopt by farm women to increase their income through training and skill demonstrations.
- Dr. Ravi Y presented on Food habits and Nutritional Status among Farm Women in Dharwad District. He suggested for inclusion of green leafy vegetables, vegetables, tubers, fruits and milk products along with cereals and pulses will help improving the dietary practices of farm women in Dharwad district

Valedictory programme

The valedictory function of the ICNSFS-2024 was held on 08 November 2024. Dr. Sanjay Kumar, Chairman, Agricultural Scientists Recruitment Board, Department of Agricultural Research & Education, Ministry of Agriculture & Farmers Welfare, Government of India,

Chayan Bhavan, Pusa Campus, New Delhi-110 012 was the Chief Guest of this function. Other dignitaries were Dr. A. K. Nayak, Director, ICAR-CRRI, Cuttack, Dr. R. P. Singh, Director, ICAR - National Institute on Foot and Mouth Disease, Arugul, Bhubaneswar and Dr. Gaya Prasad, former Vice Chancellor (Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut) and Chairman, ICNSFS-2024, Dr. Mridula Devi, Director, ICAR-Central Institute for Women in Agriculture, Bhubaneswar, Dr. V.P. Chaudhary, Organizing Secretary, ICNSFS-2024 & Dr. S. K. Sarangi, Local Organizing Secretary, ICNSFS-2024.

Dr. Sanjay Kumar emphasized on the cultivation of nutrient rich crops particularly iron rich varieties. He also stressed on scientific processing of agricultural produce, to keep the highest level of nutrition. Diversification, integration and modern technologies such as artificial intelligence and robotics in agriculture were highlighted by him to address climate change.

Dr. Gaya Prasad stressed to produce food sustainably; women are playing a pivotal role. He highlighted the food production system from agriculture, livestock, fishery and allied sectors should integrate gender in the entire chain from production, processing to value addition. Sustainable Development Goal of zero hunger, food riots, food waste, and conflicts among communities can be addressed through sustainable production of food. Dr. R. P. Singh highlighted the importance of animal health in farming system, start-ups and entrepreneurship. Dr. A. K. Nayak, stressed on inclusion of technology, gender with integrated farming system. He also highlighted the importance of Government schemes, policies, digital technology in mainstreaming gender issues in agriculture. Dr. Mridula Devi, Director, ICAR-CIWA in her address emphasized that every year we are having new records of agricultural production, but the aspects of integration of gender perspective in agricultural research and extension need to be addressed.





Valedictory programme

Theme-wise Recommendations

Theme I: Gender-responsive Climate-Smart Technologies for Sustainable Production

1. Recommendation for Gender-responsive Crop and Soil Management
Encourage policies supporting gender-responsive approaches in soil health and crop management to empower women in sustainable farming practices.
2. Promotion of Climate-Smart Pest and Disease Control Strategies
Develop gender-sensitive extension services to disseminate climate-smart pest and disease management practices.
3. Incentivize Adoption of Conservation Agriculture Techniques
Provide financial and technical support to female farmers adopting conservation practices for sustainable production.

Theme II: Renewable Energy Technology for Gender Equity and Environmental Sustainability

1. Promote Renewable Energy Adoption in Rural Agriculture
Implement training programs for rural women on renewable energy applications, enhancing energy self-sufficiency.
2. Develop Gender-responsive Frameworks for Renewable Energy
Create frameworks ensuring equal access to renewable energy technology for women, fostering equity in energy use.
3. Incentivize Renewable Energy Solutions in Agro-based Processing
Provide subsidies for renewable energy technologies in small-scale agriculture to ease the workload of women farmers.

Theme III: Sustainable Soil and Water Management and Use of Remote Sensing and GIS in Agriculture

1. Enhance Accessibility of Remote Sensing and GIS for Women Farmers

Develop mobile applications and resources on soil and water management using GIS, specifically designed for women's accessibility.

2. Promote Efficient Irrigation Techniques

Encourage gender-sensitive extension services for the promotion of high-tech irrigation systems.

3. Support Gender-responsive Soil Conservation Initiatives

Fund programs that involve women in soil conservation, benefiting productivity and environmental sustainability.

Theme IV: Nutri-Sensitive Approaches for Gender-equitable Sustainable Agriculture

1. Promote Nutrient-sensitive Crop Varieties

Integrate gender-sensitive policies to make nutrient-rich crops more accessible and affordable.

2. Develop Gender-equitable Nutrition Programs

Design nutrition initiatives that address gender disparities in food security and health.

3. Support Women in Nutri-sensitive Value Chains

Offer financial support and capacity-building for women in nutri-sensitive value chain sectors.

Theme V: Gender-transformative Approaches in Agricultural Research and Education

1. Increase Female Representation in Agricultural Research

Initiate scholarship and mentorship programs targeting women in agricultural research and academia.

2. Empower Women in Extension Advisory Roles

Strengthen extension services by training women in advisory positions, enhancing gender inclusivity.

3. Support Women in Leadership Roles in Agriculture

Promote leadership programs to prepare women for decision-making roles within agricultural institutions.

Theme VI: Mechanization for Management of Agriculture System

1. Develop Gender-friendly Machinery

Design and distribute tools that reduce drudgery for women, facilitating productivity.

2. Support Mechanization in Post-harvest Processing

Provide accessible machinery for post-harvest tasks, focusing on technologies beneficial to women.

3. Encourage Technological Innovations to Reduce Occupational Hazards

Promote technologies that reduce health risks among women engaged in labor-intensive farming.

Theme VII: Horticultural Practices for Climate-Resilient Agriculture Production

1. Integrate Climate-smart Practices in Horticulture

Encourage gender-responsive climate-resilient techniques in horticulture to sustain production.

2. Promote Gender-sensitive Organic and Traditional Farming Practices

Support programs that integrate women into organic farming, emphasizing traditional methods like Paramparik Kheti.

3. Involve Women in Biodiversity Conservation Efforts

Increase women's roles in biodiversity conservation to enhance climate resilience.

Theme VIII: Animal Husbandry and Aquaculture for Sustainable Livestock and Fish Production

1. Implement Gender-responsive Livestock Health Programs

Develop livestock health programs that consider the roles of women in animal care.

2. Strengthen Value Chains for Women in Livestock and Aquaculture

Provide training and market access for women in livestock and aquaculture to improve profitability.

3. Promote Dairy Technology for Affordable Product Access

Enhance women's access to dairy technology to improve productivity and affordability.

Theme IX: Integration of Artificial Intelligence in Agriculture for Smart Farming

1. Promote AI-driven Decision-making Tools for Women Farmers

Create accessible AI-based tools for precision farming to empower female farmers in decision-making.

2. Encourage Machine Learning in Crop Management

Develop gender-inclusive machine learning applications for real-time crop management support.

3. Integrate IoT Solutions for Women's Accessibility in Farm Management

Implement IoT devices tailored for rural women, improving accessibility to smart farming data.

Theme X: Promoting Gender Equity in Sustainable Agriculture

1. Address Resource Gaps for Women Farmers

Implement policies that bridge the gap in resource accessibility, ensuring fair access for women.

2. Develop Inclusive Food Value Chains

Support initiatives that create equitable opportunities for women across food value chains.

3. Promote Gender-responsive Policies and Capacity Building

Invest in capacity-building programs that target gender disparities in sustainable agriculture.

Conclusion

The largest challenge facing agriculture today, both in India and globally, is maximizing returns on currently cultivated land while using environmentally friendly inputs and simultaneously managing the effects of climate change, land competition, water scarcity, degradation of ecosystem services, and volatility in food prices. Because nearly 80% of farm households in India belong to small and marginal categories, there are financial limits on increasing agricultural investment, in addition to the country's falling average farm size brought on by population increase and land competition. The issue of diminishing production as a result of environmental degradation, such as deforestation, which increases the instability of water supplies and causes soil erosion, particularly in India, is added to this.

Farm women are the invisible farmers whose contribution is immense but not visible because their contribution is primarily seen as part of their household works which is not considered as a formal sector of work. Now our governmental and non-governmental policies and programs are awakening to women farmers as a commendable contributor to the sector. Due to land competition and low productivity and profitability many of the households are becoming female headed owing to men migrating to the urban centers for other means to earn a living.

Farmers' production environments are becoming more diverse than previously believed. In this farming system, technologies are employed not just for their immediate efficiency but also for their flexibility. As a result, it is important to consider the farmers' perceptions of security and uncertainty as well as their long-term objectives. To guarantee compatibility with the local socio-economic environment, Integrated Farming System (IFS) should be Climate-Smart, Nutri-Smart and Gender-Equitable. It should be in an interdisciplinary approach—collaboration between different disciplines. Beginning with the research phase, the farming family should also be involved. Therefore, IFS should be holistic with the entire farming system, rather of just concentrating on increasing the output of a particular crop.

Aware of and utilizing the gender viewpoint in agricultural research and development is crucial given the current social, cultural, technological, and economic shifts we are experiencing. Such a paradigm shift is required in order to gather vital gender-related data and knowledge, which will serve as the foundation for the implementation of policies that will mainstream gender concerns in agriculture.

The conference provided a roadmap to address the challenges in climate-smart and gender-equitable agricultural practices. By implementing these recommendations, agricultural systems worldwide can be made more resilient, inclusive, and sustainable. Thanks to all the speakers, session chairs, co-chairs, panellist, rapporteurs, oral and poster presenters both online and offline, volunteers for showing their extraordinary interest in participating this conference and making the event a grand success. Hope to continue this collaboration in

future to make tangible gains in achieving Gender-equitable, Sustainable and Environment-friendly Agriculture.