Compendium of Abstracts

International Conference

"Transformation of Agrifood Systems through Agroecology: A Global and Regional Perspective"

INTERNATIONAL TRADE FAIR 2025 ORGANICS & MILLETS

January 23 to 25, TRIPURAVASINI, PALACE GROUND, BENGALURU

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International Conference

on

"Transformation of Agrifood Systems through Agroecology: A Global and Regional Perspective"

FOREWORD

The Government of Karnataka has consistently demonstrated its commitment to promote organic and millet products by successfully organizing a National Trade Fair in 2017 and International Trade Fairs in 2018, 2019, 2023 and 2024. These events have been instrumental in fostering a robust marketing ecosystem for organic and millet products, while also raising awareness among producers and consumers about production, processing, marketing, value addition and consumption of organic and millet products.

International Conference, organized as a part of **the International Trade Fair on Organics & Millets – 2025,** scheduled from 23rd to 25th January 2025 at Tripuravasini Palace Ground, Bengaluru, will serve as a vibrant platform for knowledge exchange. The 2025 International Conference on the **"Transformation of Agrifood Systems through Agroecology: a global and regional perspective"** is a landmark event jointly organized by KSDA, GIZ-SuATI, and FiBL, Switzerland. The conference aims to address the presssing challenges of transforming agricultural systems through agroecological innovations, focusing on critical aspects such as climate change, biodiversity loss and food security.

The International Conference will facilitate meaningful exchanges of knowledge and experiences through dialogues, deliberations and presentations by renowned national and international experts. This event will bring together a diverse group of stakeholders, including farmers, researchers, policymakers, institutions, and private-sector leaders, to share valuable insights and innovative solutions. The Government of Karnataka is optimistic that this conference will inspire new ideas, foster collaboration, and encourage all stakeholders to take collective actions for the transformation of agrifood systems through agroecology. The Publication of this compendium, which encapsulates the essence and provides a comprehensive overview of the themes, objectives and planned activities of the International Conference during Organics & Millets – 2025, the International Trade Fair, is a commendable initiative and greatly appreciated.

I extend my best wishes for the grand success of this event.

SHRI N. CHALUVARAYA SWAMY

HON'BLE MINISTER FOR AGRICULTURE

GOVERNMENT OF KARNATAKA

FOREWORD

The Government of Karnataka realising the importance of organic agriculture as early as in 2004 brought out a State policy on organic farming and has implemented several schemes and programmes under the policy to promote organic farming in the State. Karnataka has been a forerunner in the promotion of organics and millets with the First Organic and Millet Trade Fair held in 2017 and subsequently the second, third, fourth and fifth editions in 2018, 2019, 2023 and 2024 respectively at Bengaluru. Owing to these concerted efforts, once near-extinct minor millets have experienced a remarkable revival and are now in high demand as healthy traditional foods.

In line with the commitment to support farmers and enhance market access, the sixth edition of **International Trade Fair 2025 on Organics & Millets,** scheduled from 23rd to 25th January 2025 at Tripuravasini Palace Grounds, Bengaluru, will serve as a vibrant platform for knowledge exchange among various stakeholders.

The **2025 International Conference** on the **"Transformation of Agrifood Systems through Agroecology: a global and regional perspective"** being held during the **"International Trade Fair 2025 on Organics and Millets"** is a mega event organized by KSDA in colloboration with GIZ-SuATI and FiBL, Switzerland. The conference aims to bring together experts, policymakers, farmers and industry leaders to discuss and address the challenges, experiences and innovations driving the agroecological transformation of agrifood systems, both in India and globally. It includes exchange of knowledge and experiences through dialogues, deliberations and presentations by national and international experts.

The Publication of this compendium, which encapsulates the essence and provides a comprehensive overview of the themes, objectives and planned activities of the International Conference held during the International Trade Fair on Organics & Millets – 2025 will provide actionable insights into scaling organic markets, enhancing consumer awareness, fostering efficient value chains and strengthening local food systems, ultimately bridging gaps between producers and consumers for sustainable transformation.

Dr. J.RAVISHANKAR, I.A.S.

SECRETARY TO GOVERNMENT,
AGRICULTURE DEPARTMENT.

FOREWORD

The Government of Karnataka has implemented various visionary initiatives and interventions to advancing organics and millets. Among these, the annual **Organic & Millet Trade Fairs,** launched in 2017, stand out as a tranformative platform that have not only promoted millets as a people's movement but also positioned Bengaluru as the emerging **'Global Hub for Millets'**. These efforts have spearheaded a remarkable resurgence of minor millets, once at the brink of extinction, bringing them back to prominence as highly nutritious, traditional food staples in high demand.

Building on this legacy, the **6th edition of the "International Trade Fair 2025 on Organics & Millets"** organized by Department of Agriculture, Government of Karnataka, will take place on 23, 24 and 25, January 2025 at Tripuravasini, Palace Grounds, Bengaluru. This flagship event represents the state's determination to create transformative opportunities for farmers, entrepreneurs and stakeholders in the organic and millet value chains, fostering innovation, market access and global collaborations.

The **International Conference,** held as a part of this trade fair, will serve as a dynamic forum for knowledge sharing and strategic dialogue. It is a vital step toward addressing critical challenges, scaling organic production systems and adopting agroecological approaches. By convening global experts, farmers, researchers, policymakers and industry leaders, this conference will generate actionable insights and innovative solutions to enhance the resilience and sustainability of our food systems.

As Karnataka continues to lead the way in promoting organic and millets, the Department of Agriculture, GoK, proudly announces the **6th International Trade Fair 2025 on Organics & Millets,** a global event dedicated to highlighting the immense potential of organic farming and millet production. This event exemplifies the Department of Agriculture's unwavering dedication to empowering farmers, strengthening market ecosystems and fostering sustainable agricultural development.

We firmly believe that this event will reinforce Karnataka's leadership in the organic and millet sectors, drive global partnerships, and inspire collective action toward a healthier, more sustainable future.

SRI Y.S.PATIL, IAS
COMMISSIONER FOR AGRICULTURE

DR. G.T. PUTHRA
DIRECTOR OF AGRICULTURE

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International Conference

on

"Transformation of Agrifood Systems through Agroecology: A Global and Regional Perspective"

Organized by the

Department of Agriculture Government of Karnataka (GoK)

in collaboration with

The German International Cooperation (GIZ)

and

Research Insitute of Organic Agriculture (FiBL)

as part of the

"International Trade Fair on Organics & Millets - 2025"

January 23-25, 2025 | Bengaluru, Karnataka

BACKGROUND

Agroecological approaches are gaining momentum worldwide in view of the global agricultural sustainability crisis and the urgent need for a transformation of the global agricultural and food system. **The 2025 International Conference on the "Transformation of Agrifood Systems through Agroecology: a global and regional perspective"** is a landmark event addressing the transformation challenges through agricultural innovations in agroecology under the aspects of climate change, biodiversity loss and food insecurity. Agroecology offers a holistic solution and an outstanding model for an agriculture of the future by integrating ecological principles with socio-economic equity for the benefit of our farmers worldwide, who are among those most affected by climate change, biodiversity loss, soil degradation and continuously rising production costs. A transformation from conventional systems involves the three stages of increasing efficiency, substituting synthetic inputs and redesigning farms and agricultural production systems at the agroecosystem level to enhance biodiversity and resilience. At the food system level, it reconnects producers and consumers by fostering regional networks based on equity, participation and justice.

India, with its diverse and mostly small scale farming sytems is uniquely positioned to lead this transformation. This not only through various farmer movements and pilot programs of civil society organizations but strongly through the political will and push towards sustainable agricultural practices as becoming reflected in multiple initiatives of the Government of India. Karnataka stands out as a pioneer in India promoting organic agriculture by constituting an official Organic Farming Policy in the year 2004. The state's efforts have set benchmarks in promoting sustainable practices, empowering smallholder farmers and creating markets for organic and sustainable products. The Support to Agroecological Transformation Processes (SuATI) project, funded by the Federal Ministry for Economic Cooperation and Development (BMZ) of Germany and implemented by the German International Cooperation (GIZ) has further advanced integrating agroecologcial principles into farming systems of Karnataka, Madhya Pradesh, and Assam through multi-level co-ordination with relevant government organisations at national- and state- level. In addition, NABARD is receiving support from GIZ-SuATI to initiate agroecological transformation in twenty Indian states. The GIZ-SuATI project is embedded in a global Agroecology Transformation Program that promotes south-south exchange between governments and practitioners for co-creation of knowledge. Meanwhile, organizations like the Research Institute of Organic Agriculture (FiBL) play a critical role globally by advancing organic farming practices, collaborating with farmers, NGOs and institutions to promote sustainable food systems through research, knowledge transfer and advisory services.

Building on this momentum, to strengthen the initiative the Department of Agriculture, Government of Karnataka (GoK), in collaboration with the GIZ-SuATI project, successfully organized the International Conference "Transformation into Organic and Agroecology-based Agriculture in

Karnataka" in January 2024. This conference provided valuable insights into the lessons learnt and challenges associated with scaling organic production systems and agroecological approaches in the state. In alignment with its commitment to advancing farmer welfare and expanding market access, the Department of Agriculture, GoK, proudly announces the **6th International Trade Fair 2025: Organics & Millets,** a global event dedicated to highlighting the immense potential of organic farming and millet production.

As a key highlight of this trade fair, the **International Conference 2025: "Transformation of Agrifood Systems through Agroecology: A Global and Regional Perspective"** jointly organized by KSDA, GIZ-SuATI and FiBL, Switzerland. The conference aims to bring together experts, policymakers, farmers, and industry leaders to discuss and address the challenges, experiences and innovations driving the agroecological transformation of agrifood systems, both in India and globally. It includes exchange of knowledge and experiences through dialogues, deliberations and presentations by national and international experts. This event will bring together farmers, researchers, policymakers, institutions, and private-sector leaders to share their insights. We hope that the conference will generate new knowledge and stimulate all stakeholders to **Take Joint Actions for the Transformation of Agrifood Systems through Agroecology.**

The program of the international conference is divided into **six sessions and two group activities:**

Session 1 will reflect and present innovations from agricultural research and extension to increase efficiency and reduce chemical inputs at the farm level **(Transformation level 1)** towards more sustainble crop production systems building resilience against the effects of climate change with examples from India and internationally.

Session 2 will look into the transformation to organic production at the agroecosystem level by substituting chemical inputs **(Transformation level 2)**. It will provide examples on how this can be achieved through crop and system diversification, importance of landraces and farmers seed networks, bioinputs and soil health strategies.

Session 3 is planned to discuss the importance and the advances of redesigning agricultural systems at the landscape level towards increasing resilience and self-regulation **(Transformation level 3)**. Different types of agroforestry systems, the introduction of diversity in farm structure and ecologically-based rotations, multiple cropping systems and the integration of livestock are playing here a crucial role. Experiences in scaling agroecological approaches at the landscape level will be presented.

Session 4 will cover and discuss aspects of the transformation at the food system level **(Transformation level 4)**, connecting those who grow our food and those who consume it with special focus on organic markets, consumer awareness and interest among others.

Session 5 will present and discuss best practices in policies, partnerships and knowlde exchange **(Transformation level 5)**. It focuses on how the agriculture and food systems of the future can help reduce our ecological footprint recognizing that there are limits to growth and what it really means to live sustainably. How will our agroecology-driven food system look like? What is the role of the society and what are the incentives needed to stimulate these changes? What are the essential changes in policy, support systems, funding and choices for producers and consumers?

Session 6, the conference will be finalized with concluding remarks from the organizers providing a summary of main lessons learnt and recommendations of the conference for **Joint Actions** for the **Transformation of Agrifood Systems through Agroecology and The Road Map Ahead".**

Activity 1: World Café

Topic: Strengthening Agroecological Systems through the Conservation and Use of Landraces

This activity will foster in-depth discussions and generate actionable insights on how to integrate landraces into agroecological systems, with a focus on enhancing sustainability, resilience and biodiversity within agricultural landscapes.

Activity 2: Fish bowl

Topic: From Farm to Fork: Inspiring Consumer Action and Growing Organic Opportunities

The session will provide actionable insights into scaling organic markets, enhancing consumer awareness, fostering efficient value chains and strengthening local food systems, ultimately bridging gaps between producers and consumers for sustainable transformation.

PROGRAMME SCHEDULE

Thursday, January 23, 2025

14:00 - 14:10 : Welcome note by Ashok M Dalwai, IAS (Retd). Chairman, Karnataka Agriculture Price Commission, Government of Karnataka

14:10 - 14:20 : Lighting of the Lamp

14:20 - 14:30 : Address by R Ravi Babu, General Manager, FSDD, NABARD, Mumbai

14:30 - 14:40 : Launch of Knowledge Product on Soil Health by GIZ-SuATI

14:40 - 14:50 : Address by Gerald Guskowski Cluster Coordinator GIZ -ECCNRM

14.50 – 15.00 : Introduction note on the conference: Jürgen Kroschel

Session 1: Farm-level transformation for sustainable production: Enhancing efficiency and reducing chemical inputs through agricultural innovations (Transformation Level 1)

Chair of the session: Amritbir Riar, FiBL

Rapporteurs: Sagar N & Pradipta Kishor Chand, GIZ

15:00 - 15:20 : Nature positive solutions for shifting agrifood systems to more resilient and sustainable pathways: Carlo Fadda, Agrobiodiversity and CGIAR, Kenya

15:20 - 15:40 : Impact of climate change on agricultural productivity and measures for increasing the resilience of agroecosystems: Roopam Shukla, IIT, Roorkee, India (virtual)

15:40 - 16:00 : Enhancing agricultural sustainability through water and soil management: Implications, Challenges and smart irrigation strategies for climate resilience in Himachal Himalayas: Ranbir Singh Rana, CSKHPKV University, India

16:00 - 16:20 : Harnessing ecosystem services for pest and nutrient management: Ravishankar Manikam, World Vegetable Centre, India

16:20 - 16:40 : Integrated pest management focusing on advances and innovations in biological control: Frank Chidawanyika, ICIPE, Kenya (virtual)

16:40 – 17:00 : Innovations in disease management in vegetatively propagated crops: Elly Ouma Atieno, CIP, Kenya

17:00 – 17:20 : Artificial intelligence and sustainability in agriculture: Rushi Vyas, University of New South Wales, Australia

17:20 – 17:40 : Fostering agricultural extension innovations for sustainable food systems: Randhir Singh Poswal, Ex-ADG (Extension), ICAR, India

17:40 – 18:00 : Discussion and wrap up

Friday, January 24, 2025

Session 2: Agroecosystem transformation for organic production: Best practices and substituting chemical inputs through the use of bioinputs, and soil health strategies (Transformation Level 2)

Chair of the Session: Ute Rieckmann, GIZ

Rapporteurs: Manoshi Chakroborty & Pran Ranjan, GIZ

09:30 – 09:50 : Indigenous knowledge and participatory research as basis for the transition to agroecological practices: Alexander Heer, FiBL, Switzerland

09:50 – 10:10 : Utilization of bioresources in agriculture to support the circular economy: Aqeel Hasan Rizvi, CIFOR-ICRAF, India

10:10 – 10:30 : Agroecology transition and its impact on socio-economic sustainability dimensions. A TAPE case study in Southern Tanzania: Veronica Massawe, SWISSAID, Tanzania

10:30 – 10:50 : Healthy soils: The basis for transforming the world's food system: Leigh Winowiecki, ICRAF, Kenya (virtual)

10:50 – 11:10 : Production, standardization and scaling of bioinputs for agroecological farming practices - challenges and opportunities: Tanay Joshi, FiBL, Switzerland

11:10 – 11:30 : Discussion and wrap up

11:30 – 13:00 : Activity 1: World café
Strengthening Agroecological Systems through the Conservation and Use of Landraces

13:00 – 14:00 : Lunch Break

Session 3: Reimagining agricultural systems: Enhancing resilience and self-regulation with agroforestry and landscape approaches (Transformation Level 3)

Chair of the Session: Chandrashekhar M. Biradar, GGGC

Rapporteurs: Ashok Kumar & Hariom Nirala, GIZ

14:00 - 14:20 : Contribution of trees to the productivity of farming systems and the lives of rural communities: Fergus Sinclair, Bangor University, UK

14:20 – 14:40 : Mainstreaming agrobiodiversity for enhancing climate resilience, nutrition, livelihoods and ecosystems services: J. Rana, Bioversity International, India

14:40 – 15:00 : Redesigning agroecosystems based on a new set of ecological processes - from farm to landscape: Gopal Kumar, IWMI, India

15:00 – 15:20 : Agroecology landscape approach implemented by the NABARD's JIVA Initiative in India – Experiences and challenges: Deepak Chamola, GIZ-SuATI, India

15:20 – 15:40 : Discussion and wrap up

Session 4: Driving food system change: Empowering consumers and expanding organic markets (Transformation Level 4)

Chair of the Session: Kirti Mishra, ECOCIATE

Rapporteurs: Mridul Bhargava & Parul Thapa, GIZ

15:40 - 16:00 : Strengthening local food systems by building shorter, more resilient supply chains: Maestrini Nicoletta, FiBL, Switzerland

16:00 – 16:20 :Strategies for building transparency and streamlining efficiency across the food value chain: Geetha Ravichandran, IRS (Retd), India

16:20 – 16:40 : NIR spectroscopy technologies for transparency and efficiency in the food value chain: Rakesh Bhardwaj, ICAR- NBPGR, India

16:40 – 17:00 : Creating awareness among school children on Agroecosystems, safe and healthy food: A case study from Karnataka: Kiran Bhaskaran, Indian Farm School

17:00 – 17:30 : Discussion and wrap up

17:30 – 18:30 : Activity 2: Fishbowl
From Farm to Fork: Inspiring Consumer Action and Growing Organic Opportunities

Saturday, January 25, 2025

Session 5: Driving food system change: Best practices in policies, partnerships, and knowledge exchange (Transformation level 5)

Chair of the Session: Rajeev Ahal, GIZ

Rapporteurs of the Session: Liesa Nieksan & Deepak Chamola, GIZ

09:30 - 09:50 : The future of sustainable food value chains and clusters: Emiliano Duch, Trustee-Foundation Clusters and Competitiveness, Spain (virtual)

09:50 - 10:10 : Indian's state policies and schemes in agriculture - A critique from the transformation perspective: Ashwini Chandak, Ecociate, India

10:10 - 10:30 : Challenges of large-scale organic conversion policies - lessons learnt from Bhutan: Christian Lippert, University of Hohenheim, Germany (virtual)

10:30 - 10:50 : Concept, best practices and challenges of eco model regions to strengthen organic production and consumption - experiences from Germany: Claudia Heid, LfL, Germany (virtual)

10:50 - 11:10 : Private to public partnerships for fostering resilient food systems in Karnataka: Saurabh, IDH, India

11:10 - 11:30 : Foresight on food system transformation - recommendations and lessons learnt to scale up agroecology initiatives in India: Anne Sophie Poisot, FAO, Rome, Italy (virtual)

11:30 - 11:50 : Knowledge Center for Organic Agriculture and Agroecology in Africa (KCOA) – experiences and lesson learnt: Stefanie Zeiss, GIZ, Germany (virtual)

11:50 - 12:20 : Discussion and wrap up

12:20 – 12:30 : Activity 3: Conference Evaluation

Session 6: Transformation of agrifood Systems through agroecology in India: The Road Map Ahead

12:30 – 13:15 : Plenary Session – Summary of Key Takeaways and Way Forward: By: Jürgen Kroschel, UoH, Germany and Amritbir Riar, FiBL, Switzerland

Panel Members:

1. Y.S. Patil, IAS, Commissioner of Agriculture, GoK
2. G.T. Puthra, Director of Agriculture, GoK
3. Jitendra Singh Parihar, Dy. Director Department of Agriculture, Madya Pradesh
4. Fergus L Sinclair, Professor, Bangor University, UK
5. Namerta Sharma, State Implementation Lead, GIZ-SuATI
6. Chandrashekhar Biradar, Founder and Director, GGGC

13:15 – 13:30 : Vote of thanks by Namerta Sharma, State Implementation Lead, GIZ-SuATI

Session 1

Farm-level transformation for sustainable production: Enhancing efficiency and reducing chemical inputs through agricultural innovations (Transformation Level 1)

Carlo Fadda

Carlo Fadda is the Research Director for Biodiversity for Food and Agriculture focused on four major research areas: agrobiodiversity in production systems, conservation, characterization, and genomics of bananas, forest genetic diversity, and biodiversity-related policy. Carlo is also leading the global initiative called Nature Positive Solutions, which is part of CGIAR. This trans-disciplinary project promotes sustainable agriculture and nature-positive solutions in five countries: Kenya, Burkina Faso, India, Vietnam, and Colombia. It aims at ensuring food and nutrition security, improved livelihood within planetary boundaries by promoting biodiversity. He holds a PhD in Evolutionary Biology from the University of Rome “La sapienza.”

Nature Positive Solutions for Shifting Agrifood Systems to More Resilient and Sustainable Pathways

Carlo Fadda[1], Chris Kettle[1], Kristin Davis[2], Stef De Haan[3], Solomie Gebrezghaber[4]

[1]Alliance of Bioversity International and CIAT, [2]IFPRI, [3]CIP, [4]IWMI

As the world is facing multiple, interrelated crisis, all of which have significant costs, agriculture is more and more understood as an important trigger of these crises. As a matter of fact, the climate crisis, the biodiversity crisis, the food and nutrition security crisis, the land degradation crisis, the water crisis, the climate crisis, are all linked to unsustainable agriculture practices. A more sustainable, nature positive and systematic approach is therefore needed. The approach needs to recognize the intercorrelated nature of the mentioned crises and the need to address them in a systemic way. Being mindful of the need not to compromise food security and economic viability, the proposed approach takes a landscape approach, makes explicit the external costs of food production and considers the need to integrate circularity into sustainable farming. It is important to recognize the need to bring more diversity, both trees and crops, and the nature positive propose a systematic approach and tools to accelerate the identification and delivery of such diversity. Finally, we will elaborate on how our approach will be economically viable and will provide economic benefits to a number of food system actors along the value chain.

Keywords: biodiversity, circular economy, true cost accounting, seed systems

Roopam Shukla

Prof. (Dr.) Shukla is currently working as an Assistant Professor at the Centre of Excellence in Disaster Mitigation and Management (CoEDMM), Indian Institute of Technology, Roorkee (IITR), and a Guest Scientist at the Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany. Before joining IITR, she was working as a post-doctoral researcher at Adaptation in Agriculture Systems working group at PIK, Germany. Her research expertise lies in the social vulnerability assessment in smallholder agriculture systems, Differentiated perception and risk attitudes to climate risks, Mixed method approach for socio-ecological systems, and societal applications of remote sensing. Her academic journey is marked by numerous notable achievements. She completed her doctorate from The Energy and Resource Institute School of Advanced Studies (TERI-SAS), Delhi. In addition, her contribution to her research domain was recognized with the Geo.X Young Academy Award in 2020, showing her commitment to building a climate and resilient society.

Impact of Climate Change on Agricultural Productivity and Measures for Increasing the Resilience of Agroecosystems

Roopam Shukla[1]

[1]Assistant Professor at the Centre of Excellence in Disaster Mitigation and Management (CoEDMM), Indian Institute of Technology, Roorkee (IITR)

Climate change poses a significant threat to agricultural productivity, with rising temperatures, shifting precipitation patterns, and extreme weather events disrupting crop yields, food supply chains, and rural livelihoods. These challenges are compounded by unsustainable practices such as monoculture and excessive use of agrochemicals, which degrade soil health and reduce agroecosystem resilience. Resilience in agroecosystems is characterized by the ability to adapt, recover, and maintain productivity in the face of climatic shocks, while simultaneously conserving agrobiodiversity, and ensuring sustainable livelihoods. The talk presents results from two study that aim to access and explores effective measures to enhance the resilience of agroecosystems. Based on our finds we argue that there is a need to shift the spotlight from crop yield to crop diversity for more meaningful assessment of climate resilience. Further the talk brings out pitfall that needs to be avoided when aiming for agro-ecological transition using agroecological approach. The findings aim to provide actionable insights for policymakers, funders, and development practitioners, ensuring the transformation of agricultural systems toward greater resilience, food security, and sustainability amidst growing climate uncertainties.

Ranbir Singh Rana

Dr Ranbir Singh Rana, Professor/ Principal Scientist (Agronomy) and Program Director in Centre for Geo-informatics CSKHPKV, Palampur obtained his B.Sc. (Ag), M.Sc in Agronomy from CSKHPKV, Palampur and Ph.D in Agriculture (Agronomy) from GB PUA&T, Pantnagar in 1994 and Certificate course in GIS&RS from Netherlands He joined CSKHPKV, Palampur in 1995 as Assistant Scientist (Agronomy) and promoted as Principal Scientist (Agronomy) in 2010. Presently executing research projects on domains like Applications of Medium and Extended range weather forecasting in AI Sectors, climate change impacts assessment, adaption and mitigation using crop modelling approach, climate vulnerability assessment related projects and applications of GIS and Remote sensing in Agricultural Sectors. He is executing very prestigious NAHEP, ICAR and World Bank funded Project on "PROTECTED AGRICULTURE AND NATURAL FARMING".

Enhancing Agricultural Sustainability through Water and soil Management: Implications, Challenges and Smart irrigation strategies for Climate Resilience in Himachal Himalayas

Ranbir Singh Rana[1], Avnee[2], Tarun Sharma[1] and Ranu Pathania[1],

[1]Centre for Geoinformatics Research and Training, CSK HPKV Palampur-176062 (HP), India

[2]Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh 176062, India

Agriculture is a cornerstone of India's economy, contributing 18-19% to the GDP and employing about 55-56 % people. However, it is also a significant greenhouse gas emitter, driven by livestock, fertilizer use, and inefficient irrigation. In the current era of transformative advancements, climate smart agriculture fuelled by Artificial Intelligence (AI), combined with smart irrigation and soil management emerges as a crucial solution to the imminent challenge of feeding an additional 2 billion people by 2052 amidst the intensifying impacts of climate change and limiting resources. AI plays a pivotal role in optimizing agricultural processes, from predicting optimal planting times to efficiently allocating resources like water and fertilizers in diverse farming systems, including conventional, organic, and natural farming. Climate-Smart Agriculture like Organic and Natural Farming promote soil health, reduce emissions, and enhance resilience through techniques such as mulching, composting, and biofertilizer use etc. Key initiatives, such as the Andhra Pradesh Community Natural Farming (APCNF), have transformed millions of acres, increased farmer incomes and reducing input costs. Organic and no-till practices further enhance soil health, water retention, and biodiversity, fostering resilience against climatic extremes aligned with national initiatives of promoting natural farming. Protected environment agriculture, including hydroponics and protected farming systems, offers sustainable solutions for increasing agricultural productivity with minimal environmental degradation. Effective water management is pivotal for maintaining

agronomic balance, particularly in water-scarce regions like the Himachal Himalayas, where glacial meltwater and rainfall are crucial for agriculture. Advanced technologies such as GIS, IoT, AI, and real-time weather-based irrigation scheduling enable precise evapotranspiration estimation and efficient water use. Indigenous traditional agro-practices and region-specific water management strategies are crucial for sustainable agriculture and to preserve soil health and optimize water use without exhausting natural resources. Tailored to local agroecological conditions, these scientific validated methods ensure resilience and productivity. Integrating traditional knowledge with modern technologies amplifies sustainability, securing resources and productivity for future generations. The various government schemes and missions play a crucial role in ensuring the sustainable use of natural resources. Government schemes and missions play a crucial role in ensuring the sustainable use of natural resources. Conservation measures, such as micro-irrigation, watershed development, and modern irrigation techniques, support judicious water and soil management. Scaling smart irrigation technologies and promoting sustainable farming systems align economic growth with ecological preservation, securing future food production while safeguarding environmental health.

NOTES

Ravishankar Manickam

Dr. Ravishankar Manickam is a Senior Scientist at the World Vegetable Center (South and Central Asia) with over 19 years of experience in vegetable production across South Asia, East Asia, and Africa. He specializes in promoting sustainable farming systems through agroecological practices that enhance biodiversity, improve soil health, and support climate resilience. His work integrates ecological principles into pest and nutrient management, focusing on crop diversification, bio-inputs, and soil health strategies to reduce chemical dependency. Additionally, Dr. Ravishankar excels in vegetable nursery entrepreneurship development and vegetable grafting to manage biotic and abiotic stresses, contributing to innovative solutions that advance productivity, sustainability, and environmental resilience in vegetable farming.

Harnessing Biodiversity and Ecosystem Services aor Pest and Nutrient Management

Ravishankar Manickam[1], Lukas Pawera[2], Srinivasan Ramasamy[2], and Aravazhi Selvaraj[1].

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[2]World Vegetable Center, 60 Yi Ming Liao, Shanhua, Tainan 74151, Taiwan, Republic of China.

The growing need for sustainable and resilient agricultural systems necessitates a shift from conventional practices reliant on chemical inputs to approaches that harness ecosystem services for pest and nutrient management. Agroecosystem transformation through organic production offers a pathway to achieve this transition, integrating ecological principles into farming systems to enhance productivity and sustainability. This presentation explores the role of crop diversification, bio-inputs, and soil health improvement in substituting synthetic inputs while addressing key challenges in pest, disease, and nutrient management. Crop diversification, including border crops, intercropping, crop rotation, trap cropping, repellent cropping, and agroforestry, promotes habitat heterogeneity and fosters natural pest control by enhancing the abundance and diversity of beneficial organisms such as predators and parasitoids. Concurrently, diversified cropping systems improve nutrient cycling, reduce leaching, and stabilize soil organic matter. Adopting bio-inputs, such as biopesticides, biofertilizers, and microbial inoculants, augments soil microbial activity, improving nutrient availability and plant health while mitigating pest and disease pressure. Soil health strategies, such as integration of compost, cover crops, and minimum tillage, further enhance the agroecosystem's capacity to deliver ecosystem services by building soil carbon, improving water retention, and supporting beneficial soil biota. Case studies from various agroecosystems demonstrate that integrating these approaches can effectively reduce chemical inputs, reducing environmental impacts while maintaining or enhancing yields. This presentation highlights the synergies between agroecological practices and ecosystem services, offering actionable insights for scaling organic production systems. By leveraging nature-based solutions, farming communities can transition toward more sustainable, economically viable, and climate-resilient agroecosystems.

Keywords: agroecosystem transformation, crop diversification, ecosystem services, bio-inputs

Frank Chidawanyika

Frank Chidawanyika (PhD) is a Researcher at icipe (Kenya), spearheading the fight against pests and yield gaps using agroecological approaches. Prior to icipe, he was a Researcher at the Agricultural Research Council, South Africa (ZA) and later a Senior Lecturer at the University of the Free State (ZA) where he worked on the ecophysiology, and biological control of invasive alien species. Currently, Frank coordinates projects focusing on agroecology for pest control and soil health. This work, combined with his commitment to food/ nutritional security and rural development, has led him to a more focused expertise on agroecology and food systems transformation.

Integrated Pest Management Focusing on Advances and Innovations in Biological Control

Frank Chidawanyika[1], Shephard Ndlela[1], Komivi Senyo Akutse[1], Samira Mohamed[1], Sunday Ekesi[1]

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Through their devastating impacts on key strategic crops, insect pests pose significant threats to both food and nutritional security. Chemical control remains largely unsustainable due to relatively high costs, resistance development, and non-target effects compromising both environmental and human health. To counter this, icipe together with national partners has developed several biologically intensive methods for pest control, which are widely accepted for their efficacy and for being environmentally benign. Using various agroecological systems, the current paper will first address recent advances in biological control of cereal and vegetable pests using companion cropping based on stimulo-deterrent-diversionary strategies that enhance trophic interactions and the efficacy of natural enemies. Second, the paper will address how integration of classical biological control and augmentative measures incorporating both parasitoids and biopesticides can enhance crop protection in these polycropping systems together with orchard tree crops to manage devastating invasive pests such as the fall armyworm *(Spodoptera frugiperda)* and various fruit flies. Last, the paper will focus on the current challenges faced in implementation of such strategies, particularly in smallholder farming systems in sub-Saharan Africa giving directions for ensuring sustainability and food systems transformation.

Keywords: nutrition-sensitive agriculture, one health, parasitoids, push-pull technology

Elly Atieno

Elly Atieno is a Seed Systems Scientist at the International Potato Center (CIP) in Nairobi, Kenya, and a doctoral fellow at Wageningen University, Netherlands. He holds a master's in plant Pathology and a bachelor's in agriculture (Crop Protection) from the University of Nairobi. With over 12 years of experience at CIP, Elly has coordinated research and capacity-building projects across Africa and provided training support on potato diseases diagnostics in India, Bhutan, and Nepal. His expertise lies in seed systems development, sanitary and phytosanitary systems development, early-generation seed production, plant disease diagnostics and management.

Innovations in Disease Management in Vegetatively Propagated Crops

Elly Atieno[1], Kalpana Sharma[1], Jorge Andrade[2], Kwame Ogero[3], Segundo Fuentes[2], Willmer Perez[2], Myriam Izarra[2], Shadrack Nyawade[1], Bramwel Wanjala[5], and Jan Kruze[2]

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Vegetatively propagated crops, including potato, sweetpotato, cassava, yam, and banana, are essential for global food security, particularly in tropical and subtropical regions. However, their propagation methods make them prone to seed- and soil-borne pests and diseases caused by bacteria, viruses, fungi, and nematodes. As these pathogens emerge and re-emerge, conventional management strategies increasingly become inadequate. To address these challenges, integrated pest and disease management strategies that combine varietal tolerance, soil amendments, cultural practices, modern diagnostic tools, and decision-support systems are essential. By integrating tolerant cultivars with reduced fungicide doses, soil amendments and cultural practices farmers can sustainably manage diseases such as late blight, bacterial wilt, and nematodes in potato. Diagnostic tools such as Loop-Mediated Isothermal Amplification (LAMP) assays has enabled rapid, accurate, and cost-effective detection of bacterial wilt and viruses in potato, cassava, and sweetpotato at the field level, ensuring timely interventions. Digital platforms like the PlantVillage Nuru app, powered by artificial intelligence and remote sensing, offer real-time data on disease outbreaks and actionable management recommendations. Decision-support tools for optimizing fungicide use to control potato late blight, have significantly reduced the number of sprays, lowering production costs and environmental impacts. Integrating these innovations into pest and disease management systems offers a pathway to enhance the productivity and resilience of vegetatively propagated crops while addressing climate change and resource constraints. Widespread adoption requires collaborative research, capacity sharing, and supportive policies to ensure scalability and effectiveness.

Keywords: food security, LAMP, decision-support, resilience

Rushi Vyas

Rushi Vyas is a GRI Certified Sustainability Professional and a graduate in Commerce with Sustainability and Social Impact from the University of New South Wales, Australia. With a career spanning sustainability reporting, innovation, and emerging technologies, Rushi specializes in leveraging AI and data-driven tools to address global challenges in agriculture and sustainability. Rushi has worked with major brands to integrate ethical and environmentally sustainable practices and has spoken at international forums on the role of technology in driving transformative change. Passionate about the intersection of AI, innovation, and sustainability, Rushi advocates for collaborative, scalable solutions to ensure a sustainable future.

Artificial Intelligence and Sustainability in Agriculture: Global Opportunities for Innovation

Rushi Vyas[1]

[1]University of New South Wales, Australia | What's On!

Agriculture faces global challenges, including resource scarcity, climate variability, and the need for sustainable practices to ensure food security. While initiatives like the Soil Health Card (SHC) program and pest management systems demonstrate the power of technology, the potential of artificial intelligence (AI) to transform agriculture remains largely untapped. This session explores how AI and real-time monitoring technologies can enhance precision agriculture, reduce environmental impacts, and empower farmers worldwide. Through AI-driven tools, real-time airborne monitoring, and predictive analytics, this approach offers solutions to challenges such as pest outbreaks, soil health deterioration, and inefficient resource use. By integrating these technologies into existing systems, farmers can access actionable insights, enabling more efficient fertilizer application, pest control, and yield optimization. The session will provide a global perspective on the scalability of these technologies, featuring case studies and strategies for adoption across diverse agricultural contexts. Attendees will gain practical insights into leveraging AI to enhance sustainability, improve productivity, and foster resilience in agricultural ecosystems, while ensuring alignment with local needs and global goals.

Keywords: artificial intelligence, sustainability, agriculture, precision farming

Randhir Singh

Ph.D (Dairy Extension) from NDRI, Karnal; Joined ICAR as scientist in 1991; Head, Social Sciences, IIWBR, Karnal; Head, Technology Evaluation & Transfer, CSSRI, Karnal. ADG (Ag Extension) ICAR; Scientific Advisory Board Member, Syscom Project (FiBL); Currently, National Coordinator (Seed Systems), ICRISAT. Coordinated and monitored 731 KVKs for technology transfer & evaluation, efficient functioning, develop and execute innovative extension models as ADG. Research and development experience with International and national institutions. Developed Best Management Practices for producing quality wheat, Participatory Varietal Development, innovative extension model and wheat expert system. Promoted contract farming of two row barley in 50,000 ha through PPP mode. Taught agricultural extension to UG, PG and Ph.D Students. Conferred The Manthan Award South Asia 2009, Crawford Fellowship Award Australia 2005, Life Time Achievement Award by Professional Societies, Fellow SAWR.

Fostering Agricultural Extension Innovations for Sustainable Food Systems

Randhir Singh[1] and Rajbir Singh[2] and Manzoor Dar[3]

[1]ICRISAT; Former ADG (Ag.Ext.), ICAR, New Delhi

[2]Natural Resource Management Division, ICAR, New Delhi

[3]ICRISAT, Hyderabad

Indian agriculture is facing multiple challenges, including diminishing natural resources, climate variability, dominance of smallholders, and stagnant productivity in major crops. The Indian Council of Agricultural Research (ICAR) has addressed these challenges through participatory, demand-driven, and inclusive strategies for the promotion of resilient and adaptive agricultural practices under different agro-ecological regions, with its strong network of research institutes and KVKs. Context specific technologies have been made accessible to the farmers through Kisan Sarathi, expert systems, decision support systems and mobile apps. Despite shortage of extension personnel in India, the ICT initiatives have reached the last mile farmers in an efficient manner and helped them in taking informed decisions.

Farmer-led innovations, community resource persons, FPOs and self-help groups have ensured grassroot engagement and local adaptability. Climate-smart practices, including agro-ecology, farm to landscape approach, integrated organic farming systems, conservation agriculture, natural farming and water conserving technologies have addressed environmental challenges and enhanced food security. Natural farming, with its low-input, ecological approach, restores soil health, reduces external input reliance, and enhances profitability, while promoting resilience and biodiversity. Collaboration between research institutions, State Agriculture Universities, State Departments of Agriculture, Public-Private-Farmer Partnerships, and Non-Governmental Organizations has helped in scaling up innovations and bridge knowledge gaps. Special emphasis has been laid on empowering youth, women and small holder farmers through skill development and capacity-building initiatives. By fostering extension innovations and enabling policy support, India can transition towards a more inclusive, environmentally sustainable, and resilient food system, capable of delivering nutritious diets and addressing local and global food security challenges.

Keywords: innovative extension, sustainable development, youth empowerment

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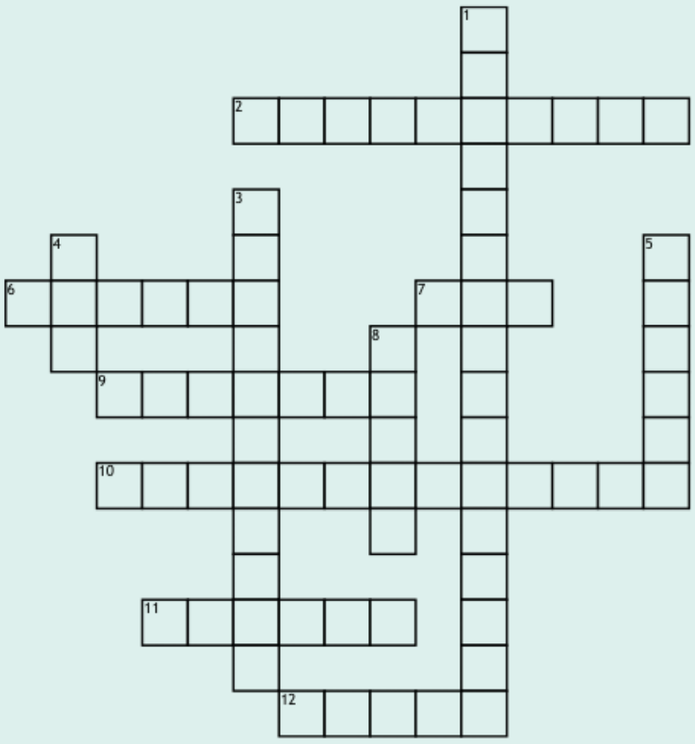
AGRICULTURE



Across

2. A person who studies and experiments with the selection and growth of crop plants and pastures.

6. A person who owns or manages a farm.

7. An animal kept to produce milk or beef.

9. A powerful motor vehicle with large rear wheels, used chiefly on farms for hauling equipment and trailers.

10. A person who studies the origin, managment and use of soils.

11. A breed of sheep.

12. A pale yellow oval citrus fruit with thick skin and fragrant, acidic juice.

Down

1. Pollination of a flower or plant with pollen from another flower or plant.

3. The science or practise of farming.

4. Grass that has been mown and dried, often use as sheep food.

5. A tapering orange-coloured root eaten as a vegetable.

8. Wheat or any other cultivated cereal used as food.

Session 2

Agroecosystem transformation for organic production: Best practices and substituting chemical inputs through the use of bioinputs, and soil health strategies (Transformation Level 2)

Alaxander Heer

Alexander Heer is a research scientist specializing in sustainable agricultural systems and statistical data analysis. He is part of the Department of International Cooperation at FiBL, where he contributes to international research initiatives aimed at improving food security, biodiversity, and climate-resilient farming practices. His work supports farmer-centric approaches to advancing agroecology in India and East, Central, and West Africa. With a Master's degree in Anthropology and Evolutionary Genetics from the University of Zurich, Simon brings a multidisciplinary perspective to his research. His expertise in data management and analysis supports evidence-based agricultural development tailored to diverse ecological and socio-economic contexts.

Indigenous Knowledge and Participatory Research as the Basis for Transitioning to Agroecological Practices

Alexander Heer[1], Rajwinder K. Riar[1], Leone Ferrari[1], Tanay Joshi[1], Veronica Massawe[2], Etienne Basset[3], Monika Messmer[1], Amritbir Riar[1]

[1]Research Institute of Organic Agriculture (FiBL), Switzerland,

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Agroecology offers a transformative framework for addressing food security, climate resilience, and social equity (Wezel et al., 2020, Bezner Kerr et al., 2021). While its potential is widely recognized, its successful implementation depends on integrating indigenous knowledge into research for development to allow for wider adoption and adaptation (Stanly et al., 2024, Dorji et al., 2024). We present evidence from our experience of the successful integration of indigenous knowledge into research for development from India and Africa, emphasizing the role of farmers' knowledge in advancing agroecological practices. Participatory cotton cultivar selection in India, where farmers were involved in site-specific selection, identified high-yielding indigenous cultivars under low-input conditions. Additionally, non-hybrid cultivars of indigenous *G. arboreum* had a 49.6% higher yield than *G. hirsutum* under medium-light soil conditions with low external input. The hierarchical Bayesian G×E analysis of participatory breeding trials on 102 farms around India, proved effective in identifying farm clusters and agroecological zones in which cultivars performed similarly, allowing tailored recommendations for farmers as well as recommendations for policymakers and stakeholders. Using similar approaches in Sub-Saharan Africa, we found that farmers' varieties (FVs) of Bambara groundnut, which are preferred by farmers (Sinafikeh et al., 2010), had no significant yield difference compared to released varieties (RVs). W These results further underscore the value of local knowledge in maintaining biodiversity and improving food security. By integrating indigenous knowledge with scientific research, participatory approaches ensure that agroecology can be tailored to local needs and thus offer a pathway for sustainable, climate-resilient agricultural systems.

Keywords: participatory research, indigenous knowledge, agroecological practices

Aqeel Hasan Rizvi

Dr Rizvi, a passionate advocate for advancing sustainable and regenerative agriculture practices, is a distinguished expert in agricultural science with a remarkable journey marked by pioneering research and innovative contributions. Holding a PhD in Agriculture Science and almost 20 years of experience, Aqeel's career has been defined by his unwavering commitment to advancing sustainable practices and pushing the boundaries of agricultural excellence. Aqeel's focus on bioresources and biochar underscores his commitment to sustainable farming practices. His expertise has elevated his visibility within the scientific community and positioned him as a thought leader in bioresource utilization. He has many international and national publications to his credit.

Utilization of Bioresources in Agriculture to Support the Circular Economy

Aqeel Hasan Rizvi[1], Archna Singh[1], Raj Kumar Singh[1], Shiv Kumar Dhyani[1] and Javed Rizvi[1]

[1]CIFOR-ICRAF, Asia Continental Program-India, NASC Complex, New Delhi-110012

The adoption of bioresource-based solutions in agriculture represents a pivotal step toward realizing a circular economy. This approach emphasizes sustainability, efficient resource utilization, and waste reduction. India's agricultural sector, a cornerstone of its economy, generates vast quantities of crop residues annually. However, a significant portion of this biomass remains underutilized and is often burned, causing severe air pollution and soil degradation. The transformation of waste biomass into a valuable resource is feasible only when it is efficiently transported to conversion units. Alternatively, establishing production setups directly at farm gates can eliminate additional transportation costs and enhance resource utilization. Transforming this agricultural residue into a valuable asset is critical, and biochar production offers a promising solution. Produced through the pyrolysis of organic biomass, biochar not only enriches soil but also addresses climate change by stabilizing carbon in a long-lasting form. Biochar improves soil quality by enhancing water retention, nutrient availability, and structural stability, reducing the excessive need for synthetic fertilizers and irrigation. To advance biochar production and use, CIFOR-ICRAF, in collaboration with GIZ, conducted trials of three methods—pyrolizer, drum kiln, and pit—at the community level. Locally available feedstocks, such as cotton stalks, pigeon pea stalks, and rice straws, were processed to evaluate parameters including production efficiency, ease of use, cost-effectiveness, and environmental impact. Results revealed production efficiencies ranging from 23% to 35% across methods and feedstocks. The pyrolizer demonstrated superior environmental performance by utilizing all syngases during production, but it required the most time and incurred the highest

costs for operation and maintenance. Farmers, however, preferred the pit method for its simplicity, quicker production time, and minimal investment. Biochar produced across methods had a carbon content of 50% to 80%, converting labile biomass carbon into a stable form suitable for long-term carbon storage in soils. Scaling up biochar production and its integration into farming systems necessitates farmer education programs and localized production facilities to minimize costs and maximize benefits. Empowering communities with the knowledge and tools for biochar utilization can enhance soil health, promote sustainable agriculture, and foster a circular economy. Biochar serves as a cornerstone for sustainable agricultural practices, aligning with the principles of a circular economy. Transforming agricultural residues into a high-value soil amendment contributes to soil regeneration, carbon sequestration, and reduced environmental impact. Integrating biochar into agricultural systems offers a scalable solution to modern farming challenges, enabling resource-efficient practices that ensure economic viability and environmental resilience. This transformative approach underscores the potential of biochar to shape a sustainable and regenerative agricultural future.

Keywords: biochar, circular economy, bioresources, pyrolizer, drum kiln, pit, carbon sequestration

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Veronica Massawe

With over a decade of experience in agroecology and sustainable food systems, I specialize in promoting ecological organic farming, food security, and agrobiodiversity. My expertise includes using the FAO's TAPE to assess agroecological transitions, integrating climate resilience and gender equity into programs, and advocating for agroecology at national and international levels.

As a Senior Program Officer and Agroecology Focal Point at SWISSAID Tanzania, I lead impactful initiatives, collaborate with stakeholders, and drive policy influence. I am passionate about empowering smallholder farmers, particularly women and youth, and I combine technical knowledge with strategic leadership to foster sustainable livelihoods and resilience in agricultural communities.

Agroecology Transition in Southern Tanzania and its Impact on Socio-Economic Sustainability Dimensions. A Tape Case Study

Veronica Massawe[1], Francesco Ajena[2], Rashid Byarushengo[1], Betty Malaki[1]

[1]Swissaid Tanzania

[2]Swissaid Switzerland

The adoption of agroecology as a pathway to sustainable food systems is gaining momentum globally. In 2023, a study was carried out in SWISSAID's program area utilizing the Tool for Agroecological Performance Evaluation (TAPE) developed by FAO. Conducted across 256 households, including project beneficiaries and a comparison group, the study examined the agroecological transition and its multidimensional impacts on sustainability, food security, and livelihoods. Results reveal that beneficiary households are at the incipient stage of agroecological transition with a CAET score of 58%, demonstrating improved efficiency and recycling practices. The transition correlates strongly with enhanced income stability, food security, and reduced reliance on chemical inputs, though challenges in livestock integration and income diversification persist. Comparison households lag significantly with a CAET score of 38%, underscoring the influence of agroecological interventions. Furthermore, the study showed that participatory approaches to co-creation and knowledge sharing are vital, drawing on local traditions and farmer-led innovations. However, challenges like limited market access, inadequate policy support, and resource constraints hinder the scalability of agroecological practices. The study provided insights for building resilience to climate and economic shocks, integrating livestock and tree systems, and refining intervention strategies to accelerate agroecological transition in the region.

Keywords: agroecological food transformation, food security

Leigh Winowiecki

Dr. Leigh Ann Winowiecki is the Global Research Lead for Soil and Land Health at CIFOR-ICRAF, based in Nairobi, Kenya. A soil scientist, her research focuses on scaling farmer-centered landscape restoration, understanding drivers of degradation and quantifying the impacts of land management on soil health. Since 2009 she has co-developed and implemented the Land Degradation Surveillance Framework (LDSF) in over 40 countries across the tropics. The framework is a systematic methodology to assess soil health, land degradation and vegetation dynamics and track restoration efforts across landscapes. She has published widely on soil organic carbon, ecosystem services and land degradation across sub-Saharan Africa and the tropics, including a coherent set of open access datasets. Within the UN Food Systems Summit, she co-founded the Coalition of Action 4 Soil Health (CA4SH). With over 200 members, the Coalition aims to catalyze investments in soil health for human well-being, nature, and climate. She co-leads the CIFOR-ICRAF Landscape Restoration Transformative Partnership Platform. She is on the Scientific Task Force and the Monitoring Task Force for the UN Decade on Ecosystem Restoration, is a founding Board Member of the International Union of Agroforestry (IUAF) and on the Board of Directors of International Fertilizer Development Center (IFDC).

Advancements in Soil Health Monitoring for Ecosystem Restoration, Biodiversity, Food and Nutrition Security and Climate Action

Leigh Ann Winowiecki[1]

[1]CIFOR-ICRAF

Healthy soil is the very foundation of our food systems and provides several vital ecosystem services, from carbon sequestration to improving food and nutrition security, to regulating the water cycle to hosting biodiversity. However, land degradation negatively impacts over 3.2 billion people, globally. Efforts to combat desertification, to move from scarcity to prosperity, will need to consider how to scale soil health, globally. Continuing business as usual is no longer an option. In order to both stop further degradation and prioritize interventions going forward, a robust evidence base is needed. At CIFOR-ICRAF, we recognize the critical role of science and the need to bridge the gap between research, development, and private sector to accelerate impact on the ground. This presentation will highlight advancements monitoring soil health, land degradation and vegetation diversity, with a focus on sub-Saharan Africa. We will highlight the combination of on-the-ground field assessments, advanced data analytics, Earth Observation and citizen science to track changes overtime, including of soil organic carbon. These methods have been implemented and scaled across agricultural landscapes, rangelands, and forests, with a myriad of partners across forty countries across the global tropics.

Tanay Joshi

Dr. Tanay Joshi is a seasoned agriculture expert and sustainability enthusiast with over a decade of global experience in implementing transformative projects on agroecological systems, climate change resilience & policy frameworks. He possesses a profound understanding of sustainable practices focusing at developmental needs of stress-prone environments in Asia, Africa, and the Pacific. An IRRI Fellow with a PhD in Agronomy and Strategic planning and Policy Studies from the University of the Philippines, he has further honed his expertise through advanced studies at Cornell University. Currently, he collaborates with FiBL, Switzerland, providing technical and strategic support to implement impactful projects in India and Tanzania. Recognized with several awards for his contributions to international agricultural research, His unwavering commitment to sustainable agriculture continues to inspire meaningful advancements in the global agricultural sector.

Production, Standardization, and Scaling of Bio Inputs for Agroecological Farming Practices: Challenges and Opportunities for India

Tanay Joshi[1], Alexander Heer[1], Rajwinder K. Riar[1], Amritbir Riar[1]

[1]Research Institute of Organic Agriculture FiBL, Switzerland

Agroecology emphasizes biodiversity, sustainability and reduced reliance on synthetic inputs, offering a transformative approach to Indian agriculture (Altieri, 2018; Gliessman, 2016). Initiatives such as Bharatiya Prakritik Krishi Paddhati (BPKP) and Paramparagat Krishi Vikas Yojana (PKVY) have facilitated adoption among over a million farmers, yet scaling agroecology faces challenges. Inconsistent bio-input quality, lack of infrastructure, and limited awareness deter widespread adoption. For example, nitrogen content in farmyard manure (FYM) varies significantly, ranging from 0.5% to 1.5% (Chatterjee et al., 2017), resulting in unpredictable outcomes and continued reliance on chemical inputs (Pathak et al., 2021). FiBL's expertise in standardizing bio-inputs offers valuable lessons. Input Lists developed for Switzerland, Germany, and Sweden ensure high-quality organic inputs through rigorous evaluation, fostering farmer trust. The Organic Inputs Evaluation Network further demonstrates how harmonized input evaluation systems address quality and consistency challenges, fostering widespread trust and adoption (Speiser B., et al. 2005). Projects such as Nutribudget, optimizing nutrient flows, and ReLeaf, transforming bio-waste into sustainable fertilizers, provide scalable frameworks adaptable to India's needs. Locally driven innovations like millet-pigeon pea bio-fertilization packages highlight the potential of region-specific approaches. India can address bio-input variability by establishing decentralized bio-resource centers equipped with nutrient profiling tools and region-specific certification systems. A National Input List, inspired by FiBL's models, would provide transparency and regulatory consistency. By integrating global best practices with local innovations, India can scale agroecological farming, ensuring consistent bio-input quality, enhancing farmer confidence, and meeting the growing demand for organic produce aligned with national policy frameworks.

Key words: agroecology, bioinputs, standardization

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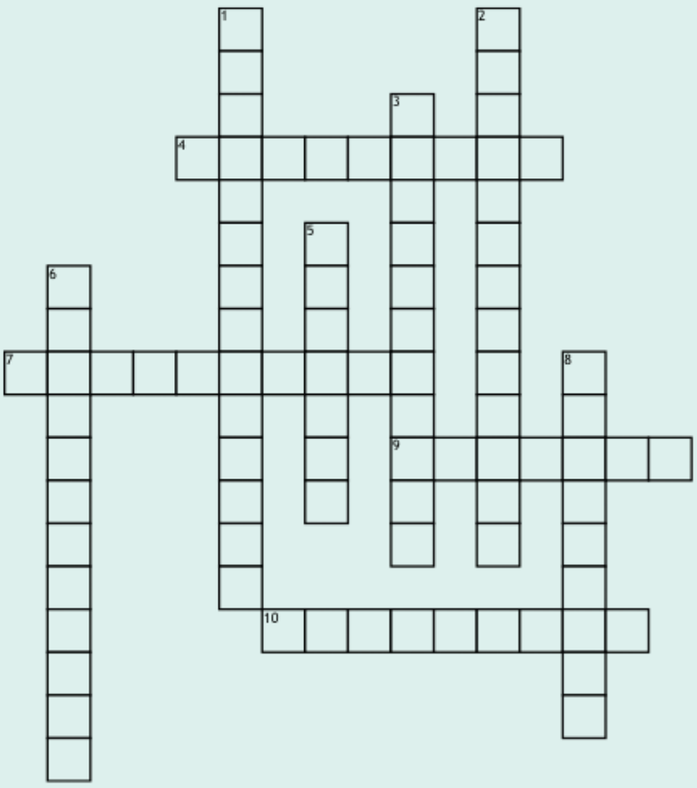

Across

4. a group of organisms that live in a specified habitat

7. all the members of a species in an ecosystem

9. the study of interactions that occur between organisms and their environment

10. all the living and nonliving parts of a community

Down

1. non living

2. living thigs

3. everything that surrounds and affects an animal or plant

5. the place in which an organism lives

6. variety among species

8. the part of earth that supports life

Session 3

Reimagining agricultural systems: Enhancing resilience and self-regulation with agroforestry and landscape approaches (Transformation Level 3)

Fergus Sinclair

Dr Fergus Sinclair is Professor of Agroforestry, Bangor University, UK and Coconvenor of the Transformative Partnership Platform on Agroecology (TPP). He is Honorary Professor at the Centre for Agricultural Research and Higher Education (CATIE), Costa Rica and Honorary Editor of the journal Agroforestry Systems. He was Chief Scientsit at CIFOR-ICRAF (Centre for International Forest Research – World Agroforestry) until 2023 and led the Livlihood Systems Flagship of the CGIAR Research Programme on Forests, Trees and Agroforestry from 2011-2021. He was project lead for the Committee on World Food Security (CFS), High Level Panel of Experts (HLPE) report on agroecology in 2019

Contributions of Trees to the Agroecological Transformation of Food Systems through Enhancing Productivity of Farming Systems and People's Livelihoods

Fergus Sinclair[1]

[1]Bangor University, UK

Trees are different in structure and function from herbaceous crops and livestock. They are large, long-lived and stationary, conferring contrasting attributes to other components. This means that their addition to fields and farming landscapes can increase productivity through niche differentiation, as well as impacting land use rights and enhancing provision of a range of ecosystem services, including carbon sequestration, water yield and biodiversity conservation. Provision of these ecosystem services attracts additional income, if appropriate payment for environmental services (PES) schemes is established. Many important ecosystem services provided by trees first manifest at landscape or community scales, requiring inclusive governance at these scales for PES schemes to operate effectively. Not all agroecology involves trees, and not all agroforestry is consistent with agroecological principles, but where trees are incorporated in agroecological transitions they can accelerate, intensify and sustain the agroecological transformation of food systems. Game changing new evidence from global and regional meta-analyses over the last three years has established that 1) productivity goes hand in hand with crop diversification; 2) where legumes are included in crop mixtures, they can substitute for nitrogen fertiliser and 3) farm level diversification can result in win-win scenarios where both economic and environmental outcomes are simultaneously enhanced. A missing middle often exists between national and international commitments to global conventions on the one hand, and action of the ground to implement sustainable and equitable agriculture on the other. Cross-sector collaboration that generates inclusive governance at nested scales is urgently required to deliver food system transformation.

Keywords: agroforestry, agroecology, diversification

Jai Rana

Dr. Jai Rana is currently working Country Director at the Alliance of Bioversity International and CIAT in India. He has done Ph.D. in Genetics and Plant Breeding and Post Doctorate in Molecular Plant Breeding. His area of research primarily focusses on enhancing adaptive management of crop diversity for resilient agriculture and improved livelihoods through strengthening crowd sourcing (putting landraces/ farmers varieties and modern varieties together and allow need based participatory selection), local seed supply systems, establishment of community genebanks, seed fairs, field evaluation trials and demonstrations that enable farmers to benefit from diversity rich solutions. He has developed 15 varieties; secured 6 patents; registered 32 genetic stocks at NBPGR, and 359 farmers' varieties at PPV&FRA, and secured Geographical Indications for 3 native rice varieties and have published >200 research papers. His work is widely recognised which is evident from various awards and recognitions such as ICAR-MS Swaminathan National Award for Outstanding Research on Hill Agriculture; Fellowship, Recognition Award and Dr LC Sikka Endowment award of NAAS; and BR Barwale award of ISPGR.

Mainstreaming Agrobiodiversity for Enhancing Climate Resilience, Nutrition, and Livelihoods

Jai C. Rana[1], Sarika Mittra[1], Rashmi Yadav[2] and Rakesh Bhardawaj[2]

[1]Alliance of Bioversity International and CIAT

[2]ICAR-Natioal Bureau of Plant Genetic Resources

Globally, humanity is facing immense challenges to sustainable development. Billions of people continue to live in poverty, hunger, and malnutrition. Natural resource depletion and adverse impacts of environmental degradation including loss of biodiversity have further undermine the ability of countries to achieve sustainable development. Greater emphasis needs to be given to maintain the genetic diversity of plants, animal and fish on farms while ensuring sustainable food, nutrition, environment, and livelihoods security. Alliance of Bioversity International and CIAT in collaboration with National Agricultural Research Systems implementing several projects and aiming to mainstream native agrobiodiversity and improving their seed systems through community seed banks and linking those production systems to various market channels. To enhance genetic diversity on farm, >8000 native varieties of food crops have been/being tested using participatory variety selection citizen science approach and so farmers have identified >400 varieties of different crops as the most potential varieties suitable to their diverse needs. Seed system strengthened by establishing around 50 community seed banks, conserving ~4000 native varieties. Presently around 100,000 farmers are using crop diversity for improved adaptation and livelihoods. To provide linkage to agrobiodiversity 06 value chains have been developed through in-depth nutritional profiling, branding, packaging, and labelling. Native varieties marked with different brand names such as Native Basket, farmers are able to sell their produce at 40-50 percent higher price. Through these efforts and innovations, we have been able to enhance climate resilience, nutrition, livelihoods and ensuring improved ecosystem services.

Keywords: agrobiodiversity, climate, nutrition, value chain

Gopal Kumar

Dr. Gopal Kumar is a Researcher specializing in Agroecology and Natural Resource Management at the International Water Management Institute, New Delhi. With over 18 years of research and leadership experience as scientist, senior scientist and principal scientist in Indian Council of Agricultural Research, he has contributed significantly to technology development on sustainable land management, climate resilience, and agroecological practices. He spearheaded projects on participatory watershed rejuvenation, soil erosion estimation, measurement and management, land degradation mapping using remote sensing and GIS and developing vegetation-based technologies for land restoration. He has authored over 200 publications including 65 peer-reviewed articles and 11 books and is recipient of several awards by national and international societies and Institutions.

Redesigning Agroecosystems Based on a new set of Ecological Processes – From Farm to Landscape

Gopal Kumar[1], Smitha Krishnan[2], Thomas Falk[3]

[1]International Water Management Institute, New Delhi, India,

[2]Alliance of Bioversity and CIAT, Bangalore, India,

[3]International Food Policy Research Institute, Germany

Addressing the interconnected challenges of climate change, resource degradation, and biodiversity loss, particularly acute in densely populated tropical regions, necessitates a transformative shift in agricultural systems. This paper proposes a framework for redesigning agroecosystems, moving beyond isolated, farm-level, chemical-intensive practices to embrace an integrated food-system, and landscape-scale approach. By adopting a co-design process that emphasizes participatory, bottom-up planning, this framework translates a community-centric, gender-sensitive vision into action through locally tailored and ecologically grounded solutions. Ecological principles such as promoting landscape-scale resource integration, biodiversity, enhancing soil health, optimizing water harvesting and use, and fostering connectivity across farms and landscapes guide the proposed framework. It prioritizes synergies and ecosystem services such as nutrient cycling, pollination, and pest regulation. The transition from fragmented farm-level interventions to a continuous farm-landscape-food-system interface strengthens ecological resilience, conserves natural resources, and mitigates climate impacts. This approach integrates practices including agroforestry, habitat corridors, soil and water conservation systems, rainfall and runoff apportioning for effective use, and bioresource management on commons, balancing productivity with ecological integrity. It acknowledges that system actors across sectors need to change practices, actions, and policies to support transformative change. The case of the Mandla Agroecological Living Landscape includes the joint formulation of diverse actors' vision and the co-development of a transition pathway. It supports a community-

level co-design of socio-technical agroecological innovations, particularly through involvement of women's self-help groups. The CGIAR Agroecology Initiative evaluated the impact of past efforts towards agroecology such as landscape-based lantana removal, land conservation, and restoration activities. We find evidence for tangible and intangible benefits of this strategy. These benefits include improved yields, diversified and regular income, enhanced nutrition, increased biodiversity, and strengthened livelihoods, particularly for tribal and marginalized communities, especially women. The emphasis on participatory co-design, involving key actors across sectors and youth sensitization efforts, ensures adaptability to local contexts, fostering long-term sustainability and equity. By scaling such practices through collaborative efforts and supportive policies, this ecological redesign framework offers a pathway to sustainable and resilient agroecosystems that harmonize agricultural productivity with environmental stewardship, from farm to landscape.

Keywords: agroecological redesign, landscape-scale integration, participatory co-design, climate resilience and sustainability

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Deepak Chamola

Dr. Deepak Chamola is a rural development professional with over 20 years of experience in designing and managing large-scale multi-stakeholder programmes. Currently, he works as adviser with GIZ India, where he engages with topics such as agroecology, sustainable food systems, and farmer collectives. He has authored several peer reviewed research articles (Scopus and ABDC indexed), conference papers, and technical reports. Additionally, he serves as a reviewer of reputable research journals such as Journal of Entrepreneurship, the International Journal of Entrepreneurship and Innovation, and Journal of Infrastructure, Policy, and Development. He enjoys applying his research skills to explore practical solutions for complex developmental issues.

Landscape Approach in Agroecological Planning: Experiences from Jiva Programme

Deepak Chamola[1]

[1]GIZ India

Despite massive increase in global food production, agrifood systems face several challenges, including biodiversity loss, poor soil conditions, unequal distribution of nutritious food, increasing public health issues, declining farmers' socio-economic conditions, and climate change. According to the FAO, the hidden cost of agri food system has reached $10 trillion. Agroecological planning, grounded in landscape-based approaches, offers a vital pathway to developing sustainable agrifood systems. JIVA is an innovative agroecology programme of NABARD, supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. It focuses on crop diversification, soil regeneration, local value addition and marketing, and capacity building. The JIVA integrates an agroecology layer into NABARD's watershed and tribal development initiatives. For the agroecological planning, farmers and villagers within the project landscape come together to demarcate cluster boundaries on a GIS map. Along with resource mapping, land use, livelihood, and demographic profiling are done. Additionally, a Fasal Chakra exercise is conducted to understand the existing cropping system across various land types. The lead farmers support fellow farmers planning poly cropping, mulching, organic pest management etc through peer-to-peer learning process. In the first year of implementation, 1,300 farmers have adopted natural farming techniques across 530 hectares. They planted over 25,000 trees and established fodders plantation on 53 hectares and set up 1,796 of nutrition gardens. It estimated that the JIVA programme (1st Phase) will further expand the agroecological transition over 4800 ha in next 4-5 years.

Key words: agroecology, agroecological planning, landscape, JIVA

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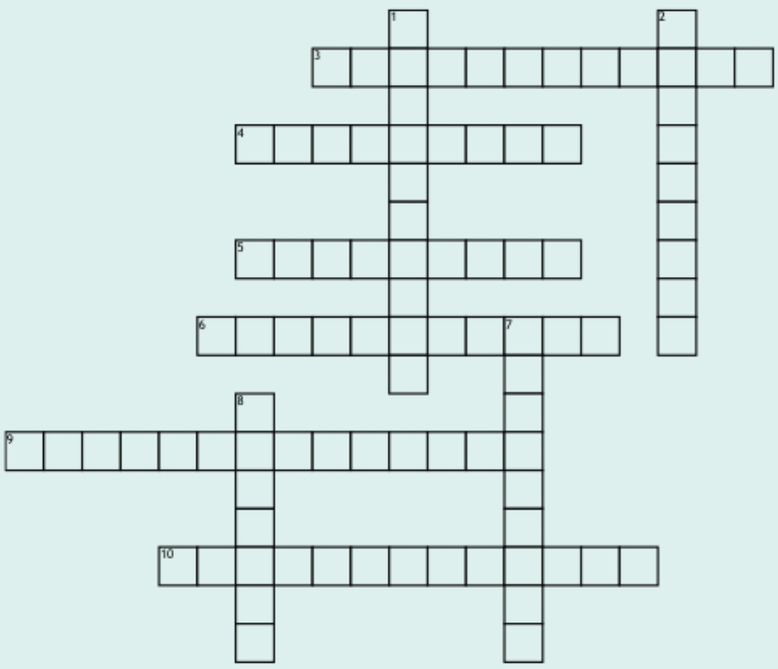
ECOSYSTEMS AND BIODIVERSITY



Across

3. It is a rich variety of life on Earth, there's variety in genes, variety among species, and a variety of ecosystems.

4. All of the population in an ecosystem.

5. the natural home or environment of an animal, plant, or other organism.

6. the surroundings or conditions in which a person, animal, or plant lives or operates.

9. Non-living things.

10. It is a living thing.

Down

1. All the members of a species in an ecosystem.

2. Part of earth that contains all ecosystems.

7. All of the living and non-living parts of a community.

8. The study of interactions that occur between organisms and their environment.

Session 4

Driving food system change: Empowering consumers and expanding organic markets (Transformation Level 4)

Nicoletta Maestrini

Nicoletta Maestrini works as a Digital Education and Digital Marketing expert at FiBL Switzerland since 2023. She is involved in several international projects worldwide, where she advises partners on the conceptualization and planning of consumer awareness campaigns, the creation of digital content for project dissemination, and the implementation of communication strategies. From 2020 to 2023, she led communications at a Berlin-based climate start-up. Between 2018 and 2023, she also coordinated communications efforts for several political campaigns in Switzerland. She holds a bachelor's degree in communications and an MA in Environmental Policy and International Cooperation. She has a particular interest in influencer marketing and how effective storytelling can shape lifestyles and lead to sustainable behaviours.

Strengthening Local Food Systems by Building Shorter More Resilient Supply Chains

Nicoletta Maestrini[1] and Thomas Bernet[1]

[1]FiBL Switzerland

The disconnect between supply and demand for healthy food presents both challenges and opportunities for local food systems. Drawing from our project experience in East Africa, this presentation highlights complementing "PULL strategies" that effectively promote market-oriented value chain collaboration and innovations. These strategies are framed within participatory approaches that empower both farmers and consumers in their efforts to adopt sustainable local food systems. Through the Participatory Market Chain Approach (PMCA), NGOs act as facilitators, uniting producers, processors, and retailers to co-create innovative solutions and strengthen value chain linkages. These efforts are complemented by the Sustainable Lifestyle Influencer Approach (SuLIA), which effectively raises consumer awareness about healthy food crops and sustainable diets and helps consumers connect directly with farmers. Participatory Guarantee Systems (PGS) further bridge the gap between producers and consumers by providing an affordable, community-based organic certification process that fosters transparency, trust, and connections. To ensure the success of these approaches, the COM-B model (Capability, Opportunity, Motivation - Behavior) can serve as a valuable framework to understand and improve adoption outcomes (Behavior) among value chain actors driven by a combination of skills and knowledge (Capability), a supportive environment and access to resources (Opportunity), and the tangible incentives to act (Motivation). All in all, the effectiveness of the presented approaches implies strong facilitation skills, relating to both process management and marketing skills. Here, NGOs are challenged to increasingly involve and build up staff that have the required skills to successfully conceptualize and implement such market-led participatory processes involving all relevant actors.

Keywords: value chain innovations; participatory processes; behaviour change

Geetha Ravichandran

Geetha Ravichandran is a 1987 batch IRS officer who retired as Principal Chief Commissioner of Income Tax, Mumbai in August 2023. She writes a monthly column for The New Indian Express on contemporary issues, including the impact of AI on education and the job market, changing patterns of food consumption, sustainability practices, climate change and gender issues at the workplace. She has published two best- selling books of poetry- Arjavam and The Spell of the Rain Tree. She is trustee of an NGO, which works on palliative care for children with terminal illnesses.

Strategies for an Efficient and Transparent Food Value Chain – A Consumer Perspective

Geetha Ravichandran[1]

[1]IRS (Retd.) Officer

Food value chain is the incremental value added at each stage by various stake holders from the point of production, through storage, processing, marketing to consumption. It is vital for food security, for scalable economies of agricultural production and for catering to consumer demand. Efficiency- Reducing the food mile, wherever feasible by promoting local and seasonal consumption is a vital step forward. It is necessary to cut down waste at every stage, production, processing and marketing. Micro warehouses and predicting consumer demand is the way forward. Consumer awareness and markets for organic products should be increased. It should not remain elitist and be available in fair price shops. Existing FPOs (Farmer Producer Organisation) should be leveraged to become a hub of processing for organic products. Kiosks, cafes and eateries run by farmers collectives using organic produce, in places with high footfall like highways should be encouraged. The last mile of the food value chain, from the market to the table must be strengthened by integrating traditional knowledge of methods of storing and preparation. Transparency- The tracking of various stages of production, processing and marketing by leveraging blockchain technology will strengthen farmer visibility and consumer satisfaction. Storage processes must ensure zero addition of chemical preservatives to organic produce. Transparent labelling that includes a nutritional score, colour coding indicating healthier options is necessary. Bio- friendly packaging that retains freshness without artificially prolonging shelf life is to be used. Feedback loop, sharing of updated knowledge and research with consumers is vital.

Keywords: food mile, integration of traditional knowledge, blockchain technology, feedback loop

Rakesh Bhardwaj

Dr Rakesh Bhardwaj is currently serving as Principal Scientist (Biochemistry) at the ICAR-National Bureau of Plant Genetic Resources, New Delhi. He leads a dedicated team focused on the quality evaluation of germplasm resources across various crops, emphasizing nutrients, phytochemicals, and secondary metabolites. Dr Bhardwaj has developed expertise in Metrology (the science of measurement), Chemometrics, and NIRS Prediction Modelling.An accomplished mentor, he has guided 8 Ph.D. and 10 M.Sc. students as chairman or co-chairman. Over the years, he has been awarded several fellowships, including the ICAR-JRF, CSIR JRF/SRF, FAO of UN, CIDA, and SWISAID. As a biodiversity expert, he has served on the FAO/INFOODS/IUNS task force. Dr Bhardwaj is also an Associate Editor for two research journals: Frontiers in Nutrition and Frontiers in Sustainable Food Systems. He holds three granted patents and one copyright, with an equal number of filings in progress. With nearly 150 research publications to his credit, approximately 20 of them focus on NIRS Prediction Modelling, further showcasing his significant contributions to the field.

Nir Spectroscopy Technologies for Transparency and Efficiency in the Food Value Chain

Rakesh Bhardwaj[1], Simardeep Kaur[2], Naseeb Singh[2], Mithra T[1], Racheal John[1], Siddhant Ranjan Padhi[1], Maharishi Tomar[3]

[1]ICAR-NBPGR, Pusa, New Delhi

[2]ICAR RC - NEH Region

[3]ICAR-IGFRI, Jhansi

Near-Infrared (NIR) spectroscopy has revolutionized the food value chain by enabling rapid, non-invasive, and accurate analyses across various stages, enhancing transparency and efficiency. This versatile technology is widely used for assessing the quality of raw materials, processed products, and their derivatives, ensuring product quality, safety, authenticity, and traceability. NIR spectroscopy evaluates key quality parameters such as protein, moisture, lipid content, and fiber in food grains, pulses, oilseeds, and flours, facilitating real-time decision-making in processing and storage. Its ability to detect contaminants and adulterants renders it indispensable for ensuring food safety. For instance, in spices such as turmeric, NIR spectroscopy effectively identifies adulterants like corn flour, wheat flour, metanil yellow, and sunset yellow dye. Similarly, it can detect impurities such as brick powder, sawdust, and Sudan red dye in chilli powder. In the case of cumin, adulterants such as nigella seeds and linseed can be reliably identified. Furthermore, in honey, NIR spectroscopy facilitates the identification and quantification of various syrup-based adulterants, thereby ensuring the authenticity and purity of the product. The analysis of spectral fingerprints also enables the authentication of geographical indicators, such as in honey, olive oil, and tea or the distinction of botanical origin of honey (monofloral/multifloral), from distinct regions/sources, even under varying environmental and processing conditions. The application of this technology extends to processed foods, where it plays a crucial

role in verifying ingredient composition and ensuring compliance with stated nutritional claims. Furthermore, in plant-based medicines and nutraceuticals, NIR spectroscopy assesses active compounds, ensure ensures consistency in quality and detects adulteration, bolstering consumer confidence and supporting regulatory compliance. Thus, NIR spectroscopy contributes significantly to enhancing supply chain transparency by integrating seamlessly with digital traceability tools, enabling stakeholders to monitor product quality from farm to fork. Its rapid and non-destructive nature facilitates real-time decision-making, reduces dependency on traditional chemical assays, minimizes waste, and lowers environmental impact.

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Kiran Bhaskaran

Mr. Kiran Bhaskaran, a seasoned organic farming expert based in Bangalore, brings over a decade of experience in sustainable agriculture. Renowned for his expertise in designing Integrated Farming Systems, fruit forests, and herbal gardens, he has trained diverse groups, including farmers, educators, and urban gardening enthusiasts. Founder of the “Indian Farm School,” Mr. Bhaskaran introduced India’s first curriculum-based school gardening program, empowering students to grow organic vegetables while fostering environmental stewardship. His impactful work extends to orphanages, old-age homes, and corporate spaces, promoting eco-friendly practices. He also advises NGOs on environmental conservation, waste management, and education initiatives.

Empowering Students with Awareness of Safe Food and Sustainability through School Gardening

Kiran Bhaskaran[1]

[1]Chief Consultant and Founder, Indian Farm School

This pilot project introduced school gardening as a transformative educational initiative, involving 426 school children aged 12 to 14 years from diverse socioeconomic backgrounds. The program was implemented in two private schools serving economically privileged students and two government-aided schools catering to underprivileged communities. Organic vegetable gardens with raised beds were created at each school, where students engaged in growing vegetables while learning about the journey of food from soil to plate. Through a hands-on curriculum, students were introduced to sustainable agricultural practices, the challenges of farming, and organic solutions for overcoming these challenges. Emphasis was placed on the importance of safe, chemical-free food for personal health and environmental sustainability. The program also explored the broader connections between food production, climate action, and sustainable living. Despite not directly interacting, students across the schools embarked on a shared journey of discovery, gaining valuable insights into the effort and intricacies involved in growing safe, nutritious food. The program helped bridge knowledge gaps, fostering critical awareness about making mindful dietary and environmental decisions. Notably, the project achieved success in instilling a deeper appreciation for healthy eating habits and sustainable practices. By sensitizing students to the value of safe food and the role of organic agriculture in addressing global challenges, the initiative laid a foundation for cultivating responsible future citizens. These findings highlight the potential of school gardening to inspire long-term behavioural change and advocate for its integration into mainstream education.

Keywords: school gardening, safe food education, organic farming, sustainable agriculture practices, climate action

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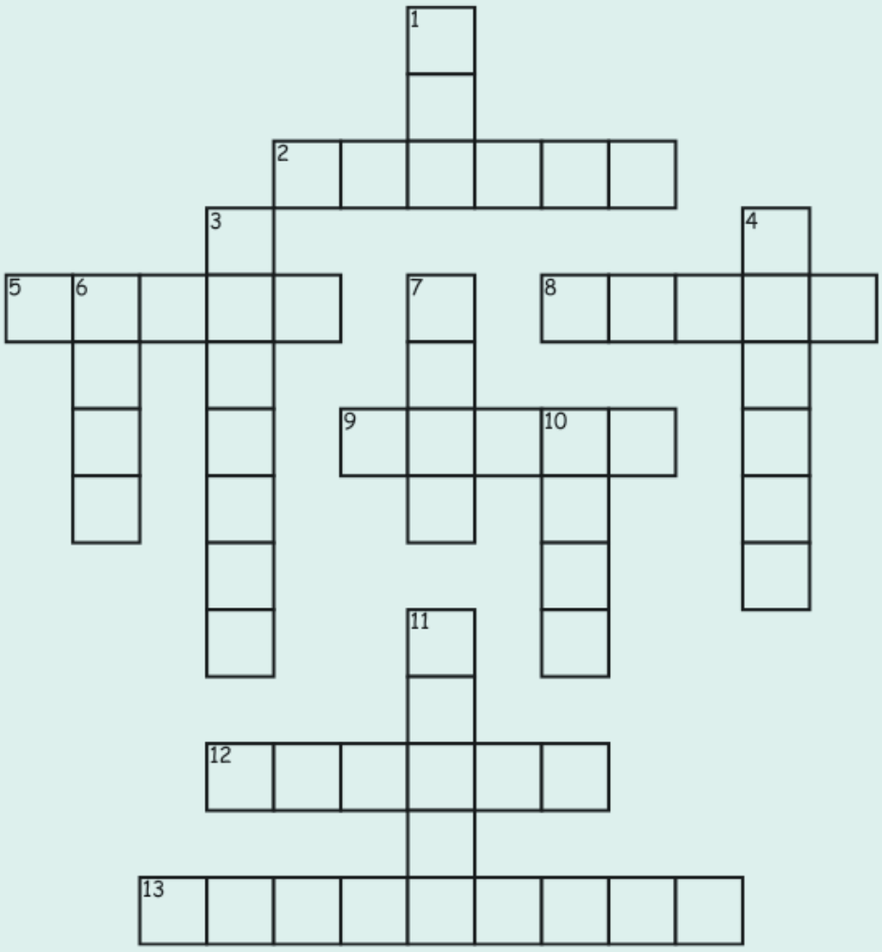
FARMING



Across

2. What is the hottest season?

5. Which part of the milk do you use to make butter?

8. What grain would you eat on Sunday?

9. What was the name of the oldest cow at Middle farm?

12. What season has the month of April in it?

13. Which month generally starts the crop farming cycle?

Down

1. What is the name of the farmers son at Wayside farm?

3. What is the name of the room where cows are milked "the milking -------"

4. What grain has whiskers on it?

6. What grain would you eat on Monday?

7. How many teets does a cow have?

10. What do you call a baby cow?

11. What crop is grown to feed the cows?

Session 5

Driving food system change: Best practices in policies, partnerships, and knowledge exchange (Transformation level 5)

Emiliano Duch

Emiliano Duch is the Chairman of the Foundation for Clusters and Competitiveness. He retired from the World Bank in 2023, where he was the Global Lead in Value Chains and Clusters. Before joining the bank, he was at the IESE Business School as the European Union's Cluster Excellence Initiative (ECEI) coordinator. He was also the founder and CEO until 2013 of the consultancy The Cluster Competitiveness Group and the founding chairman of The Competitiveness Institute (TCI) in 1998. He was one of the pioneers in cluster development, having collaborated with Prof. Michael Porter in the first practical applications of the Competitiveness of Nations methodology in the Basque Country and Catalonia. He has a degree in Architecture from the Polytechnic University of Catalonia, an MPA, and an MBA from Harvard University.

The Future of Sustainable Food Value Chains and Clusters

Emiliano Duch[1]

[1]Foundation Clusters and Competitiveness, Barcelona

The development of most food clusters has been focused on competitiveness or food security. The sustainability question has been raised only recently, almost two decades after it was raised for combustion engines when the impact of the food system is similar. This presentation is a good opportunity to think about ways to catch up. From the supply side, new technologies can reduce the carbon footprint of food production. From the demand side, to reflect on why it is so difficult to change consumer habits and aspirations that are resulting in undernourished and obese populations. More importantly, how can government policies be changed to stop subsidizing the production of pernicious products without any nutritive value, like sugar, or the overuse of scarce resources (water, phosphorus, etc.) to produce protein through livestock? The food production system policies result from years of lobbying by producers, global traders, and food multinationals that control a large share of international markets. A new approach is needed if we want to make it sustainable.

Ashwini Chandak

With more than 23 years of experience, Ashwini has extensive expertise in agriculture and allied sectors, specializing in climate resilience, agrobiodiversity, ag-tech, project management, and sustainable value chains. His expertise includes conducting landscape assessments to design climate-resilient agricultural projects, creating sustainable agriculture-allied businesses, and developing livelihoods and enterprises through a market-responsive-value-chain approach. He, as many do, attempts to answer the question- 'What does any intervention offer to farmers and farmer collectives", how the intervention can be effectively taken to them and what non-negotiables need to be integrated to facilitate adoption? He had a good fortune to lead/ be part of several initiatives and projects such as Swissaid India's CRISP & CROPS4HD, GIZ's SuATI, The World Bank's JOHAR, DFID's APRLP & WORLP, IFAD's OTELP and JICA's OFSDP etc. in developing strategies and drawing implementation plans. He has immersed himself into agroecology, regenerative and sustainable agriculture principles and supports organizations to design projects around the same.

India's State Policies and Schemes in Agriculture- a Critique from the Transformation Perspective

Ashwini Chandak[1], Kirti Mishra[1] and Namerta Sharma[2]

[1]Ecociate Consultants

[2]GIZ, India

The policy and enabling environment to promote Agroecology practices and Natural Farming, particularly in the light of Natural Farming Guidelines, has been proactive and moving in line/synchronization with the changing face of agriculture necessitated by climate change, farmers needs and dire need of rejuvenating soil, conserving water, and other natural resources. Policy recommendations from the Union Government to popularise uptake of sustainable farming practices in around 140 million operational holdings is complemented by State Governments policies and schemes. An array of Centrally Sponsored Schemes and State Sponsored Schemes are available for uptake wherein 'Soil Management, Use of Indigenous Seed, Bio Inputs, Nutrient cycling & Nutrient management, Equipment Hire Centres and Market Operations, Water Management, Integration of Livestock systems, Post-Harvest Handling and Storage, Market Management, Documentation & Scope of Certification, Strengthening Community Institution etc.' are few components where assistance has been defined in the schemes landscape. However, (i) long pending asks of stitching together an effective and efficient implementation and extension mechanism together with (ii) certain technical aspects around the adequacy of provisions in the schemes, need to be addressed to expedite coverage and ensure realization of the positive outcomes envisaged through the policy and schematic assistance. The author would share observations gathered by appreciating major policies and schemes both at the national and state (Karnataka) levels while underlining their potential for transforming Indian agriculture.

Keywords: policy, schemes, natural farming, agroecology

Christian Lippert

Since 2002 Christian Lippert is teaching Farm Economics and Environmental Economics at the University of Hohenheim. In his past research, he applied Institutional Economics approaches–including economics of law enforcement–to the analysis of agri-environmental schemes as well as to food safety issues and to the enforcement of organic farming standards. Further fields of research have been econometric analyses of the spatial distribution of land use activities like organic farming and Ricardian analyses of regional climate effects on agricultural land use. Recently, he also engaged in Discrete Choice Modeling to value ecosystem services and in the valuation of insect-mediated pollination.

Challenges of Large-Scale Organic Conversion Policies: Lessons Learnt from Bhutan

Christian Lippert[1]

[1]University of Hohenheim

So far, the Bhutanese policy objective declared in 2012 to convert the country's entire agricultural sector to organic farming could not be reached. By 2022, only 3 % of farm households had been officially registered as organic. Although many farms may be considered as "organic-by-default", it is obviously difficult to completely renounce to conventional farming practices and chemical-synthetic inputs that are not allowed in organic farming. Against this background, the challenges of a large-scale organic conversion are analyzed with special regard to its impact on major crop yields, appropriate nutrient and pest management, farm labor needs and market constraints. Given statistically derived organic yield gaps between 20 % and more than 40 % for staple foods, it is argued that a complete organic conversion is likely to increase Bhutanese food imports, which would further reduce already relatively low self-sufficiency ratios. In this context, there is a need for an improved manure management to avoid future nitrogen deficiencies when renouncing to mineral fertilizers. Further problems are farm labor shortages that are particularly relevant for labor-intensive weeding activities and partly rather monotonous crop rotations (e.g., in the case of potatoes as cash crops). Both aspects continue to incentivize pesticide use and are thus a hindrance to organic conversion. Additional obstacles are poorly developed organic markets and lacking research and extension activities directed towards the implementation of appropriate organic crop rotations and farming systems.

Keywords: organic farming, yield gaps, nutrient and pest management

Claudia Heid

She is Biologist, University of Freiburg and Regensburg in Germany. Coordination of Model Organic Region project in Bavaria, Germany. Institute for agroecology and organic agriculture of the Bavarian State Centre for Agriculture (LfL). Local economic development, GIZ Bolivia. Advisory for small farmers ecological agriculture, local marketing and agroforestry in semiarid regions in Bolivia, independent. Facilitation of participatory rural development projects and networks for agroecology, Inter team Bolivia. Project management and institutional development, AGRECOL Bolivia. Knowledge management and networking for agroecology in Latin America, AGRECOL Switzerland.

Concept, Best Practices and Challenges of Eco Model Regions to Strengthen Organic Production and Consumption - Experiences from Germany

Claudia Heid[1]

[1]Institute for agroecology and organic agriculture (IAB), Bavarian state centre for agriculture (LfL), Germany

State-accredited model organic regions are one of the components of the Bavarian state initiative Bioregio2030 which aims to increase organic agricultural production (30% until 2030) and to strengthen the demand for organic regional food. Since 2014 a growing number of model organic regions bring together local authorities, organic farmers, processors, traders, consumers, and other interested stakeholders to implement together participatively designed projects along the organic value chains relevant to the region. Regional managers as key persons are giving process and networking support to these project initiatives. Besides they organize events, spread information, and raise consciousness about the benefits of organic agriculture, regional organic food, and sustainable food systems among local decisionmakers and citizens (of every age).

Selected best practice examples of fruitful networking and participatory rural development facilitated by the regional management will be given to illustrate the first steps as well as long-term potentials of how to generate innovative value creation networks and sustainable local agendas e.g. implementing procurement of regional organic food in community facilities as schools and kindergartens.

Keywords: state accredited-model organic region in Bavaria; regional management; networking for participatory implementation of regional organic value chain projects; communication; bottom up meets top down.

Saurabh Sinha

Saurabh is a Senior Program Manager at IDH where he leads the organization's work for the Agri-Commodities Business Unit in India. As a part of this role, Saurabh has curated, designed and managed several projects around low-carbon agriculture supply chains, implementation of Regenerative Agriculture (soil nutrition, water management, bio-diversity conservation) projects on landscape-based models, and sustained livelihoods for smallholders towards Living Income. Prior to IDH, Saurabh spent majority of his career as a management consultant and in corporate strategy. Saurabh has an MBA from Warwick Business School UK where he was a dean scholar.

India Climate Resilient Landscape (ICRL)

Saurabh P Sinha[1]

[1]Senior Program Manager, IDH

Recognizing the challenges on production yields and quality profile linked to climate change events in the coffee and spices production areas of Karnataka, IDH has been engaging with the targeted private sector companies, relevant public sector actors, government departments and with the civil society organizations to move towards a shared agenda and commonly owned targets based on the Production, Protection, Inclusion (PPI) framework. The PPI framework utilizes a landscape-based approach towards sustainability that creates and links the market demand for responsibly produced agricultural commodities and uses market forces and local governance to co-invest in sustainable production. IDH implementing the India Coffee Climate Resilient Landscape (ICRL) across three districts of Southern Karnataka: Kodagu, Haasan and Chikkamagaluru to build greater climate resilience in the agriculture production systems specifically working with smallholder growers and farmers who are most suspectable to climate change events.

The ICRL program utilizes the public-private-community partnership to achieve the following impact areas:

- Building greater climate resilience in the coffee and spices production systems through application of regenerative agriculture principles to preserve or enhance natural resources such as soil, water and biodiversity.
- Reducing and mitigating greenhouse gas (GHG) emissions from the production systems and interventions in the commons
- Improving smallholder incomes towards more, stable and equitable incomes; gender inclusive supply chains with greater power in decision making

Keywords: public-private-community partnerships, climate resilience, landscape approach, sustainability

Stefanie Zeiss

Advisor in the GIZ Project Knowledge Centre for Organic Agriculture and Agroecology in Africa (KCOA) at Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Agricultural Engineer International Agriculture. Specialist for tourism and regional development. Focused on Regional development in rural Germany. Chairperson of the international organic agriculture working group of the GIZ Green innovation Centers. Worked on Integration of organic agriculture in the curriculum of Agricultural College in Malawi, incl. scientific set-up of trial conventional versus organic agriculture.

Knowledge Centre for Organic Agriculture and Agroecology in Africa (KCOA) – Experiences and Lesson Learnt

Stefanie Zeiss[1]

[1]GiZ, Germany

The vast expanse of information available on the World Wide Web can make finding relevant knowledge a daunting task. Despite this, many useful insights remain unrecorded and difficult to access. The Global Project Knowledge Centre for Organic Agriculture and Agroecology in Africa addresses this issue by collecting and validating essential knowledge on organic agriculture and agroecology in Africa. Through the development of a digital knowledge platform, this valuable resource is now accessible to anyone with just a few clicks. The platform aims to provide a one-stop solution for acquiring verified and practical knowledge, thereby empowering users to implement organic and agroecological practices. This presentation invites potential users to explore the platform, engage with its contents, and contribute to further enriching the knowledge base.

Keywords: organic agriculture, agroecology, knowledge centre, africa, digital platform

Anne Sophie Poisot

Ms. Anne-Sophie Poisot leads the Futuring Farmer Field Schools Unit in the Office of Innovation at FAO, promoting farmer-led innovation through regenerative and agroecological approaches. Ms. Poisot is the co-author of “Agro-industry versus agroecology? Two macroeconomic scenarios for 2050 in Andhra Pradesh, India,” alongside Dr Bruno Dorin (CIRAD) and Vijay Kumar Thallam (RySS, Government of Andhra Pradesh), which presents the results of the AgroEco2050 India Foresight Process, jointly implemented by the Government of Andhra Pradesh, CIRAD, and FAO. From 2022 to 2024, she led an FAO-GIZ-CIRAD project aiming at promoting the use of foresight processes to unlock agrifood system transformation processes through agroecology.

AgroEco2050: Pioneering Foresight Methodologies For Transformative Agroecological Futures

Bruno Dorin[1], Anne-Sophie Poisot[1] and Vijay Kumar[1]

[1]FAO, Rome, Italy

This presentation delves into the potential of agroecology for food systems transformation through innovative methods and findings of foresight processes. Insights from an FAO-CIRAD global guidance document on foresight to drive food systems transformation will be presented. This guidance provides a strategic framework to connect foresight and agroecology practitioners, offering practical tools to design future-oriented strategies that integrate agroecological principles and drive sustainable food systems transformation. The presentation will also summarize the results of the AgroEco2050 India exercise (2019–2022), a collaboration between the Department of Agriculture of the Government of Andhra Pradesh, CIRAD, and FAO, which developed two contrasting macroeconomic scenarios for 2050: a "Community-managed Natural Farming" transition and an industrial intensification pathway. These scenarios were outlined across key domains—employment, land use, food production, economic growth, and income inequality—anchored by a robust statistical analysis of India's structural changes from the 1970s to 2019. Additionally, we will share findings from the AgroEco2050 Senegal foresight exercise (2022–2024), jointly implemented by the government of Senegal, CIRAD, FAO and ISRA, outlining opportunities and challenges for agroecological transitions. Our discussion will highlight how participatory foresight—blending qualitative and quantitative approaches with multi-stakeholder collaboration—can empower societies and policymakers to envision and shape sustainable futures. By showcasing cutting-edge methods and results, the presentation seeks to inspire actionable strategies for achieving resilient, equitable, and sustainable agrifood systems.

Key words: natural farming – foresight – macroeconomic impact - agroecology

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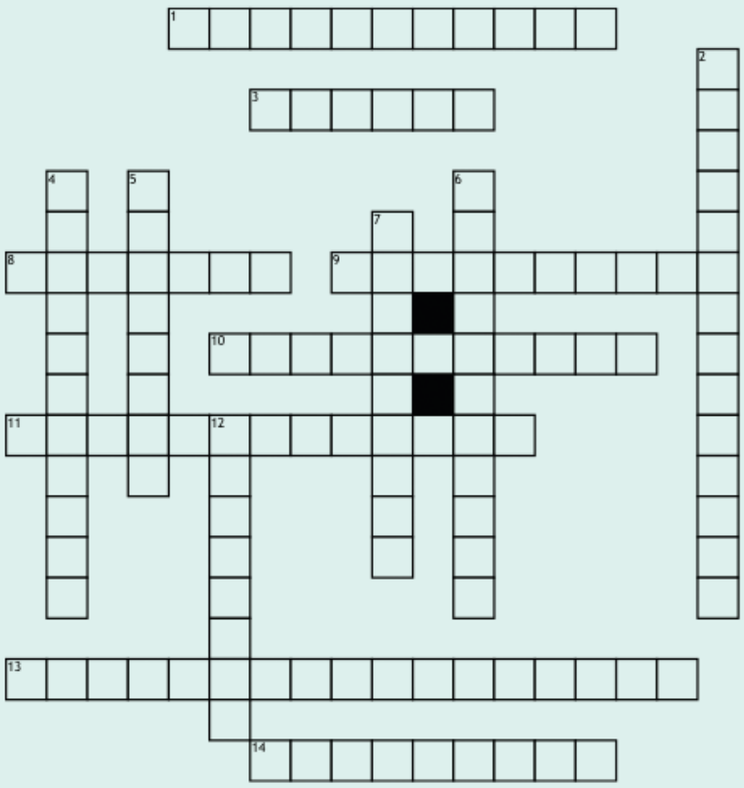
NUTRITION IN PLANTS



Across

1. organism feed on dead and decaying matter

3. bulky organic matter

8. Tiny pores on leaf surface

9. making their find itself.

10. Give pigment in plants

11. loss of water in leaves of plant

13. carnivores plants that feed on insect

14. bacteria who attracts nitrogen from soil

Down

2. process of making food

4. depend on other organism for food

5. A fertilizer supplying two or more nutrient

6. encourages root development

7. process of obtaining and utilizing food

12. organism feed on their host.

Session 6

Transformation of agrifood Systems through agroecology in India: The Road Map Ahead

Jürgen Kroschel

Professor Kroschel is an Independent Consultant for International Agricultural Research & Rural Develoment/-Apl. Professor for Agroecology and Agronomy in the Tropics and Subtropics/ Hans Ruthenberg Institute, University of Hohenheim. His expertise spans across various disciplines including Agricultural Research & Rural Extension; Tropical Agriculture; Agroecology; Organic farming; Integrated Pest Management and Biological Control; Climate Smart Agriculture and Climate Change Adaptation; Teaching and Capacity Building.

Amritbir Riar

Dr. Amritbir Riar brings over 15 years of experience in sustainable agriculture research and international cooperation. Dr Riar is an award-winning scientist recognized for transformative agroecological research and has secured several prestigious awards, including SFIAR Team Award twice. Dr. Riar holds a PhD in Agricultural and Natural Resource Sciences from the University of Adelaide, Australia. He currently serves as Deputy Head of the Department of International Cooperation and Group Leader of Resilient Cropping Systems at the Research Institute of Organic Agriculture (FiBL) in Switzerland and has been elected Vice-President of the Swiss Forum of International Agriculture Research. His expertise includes designing and managing multi-million CHF projects focused on organic and resilient farming systems and sustainable development."

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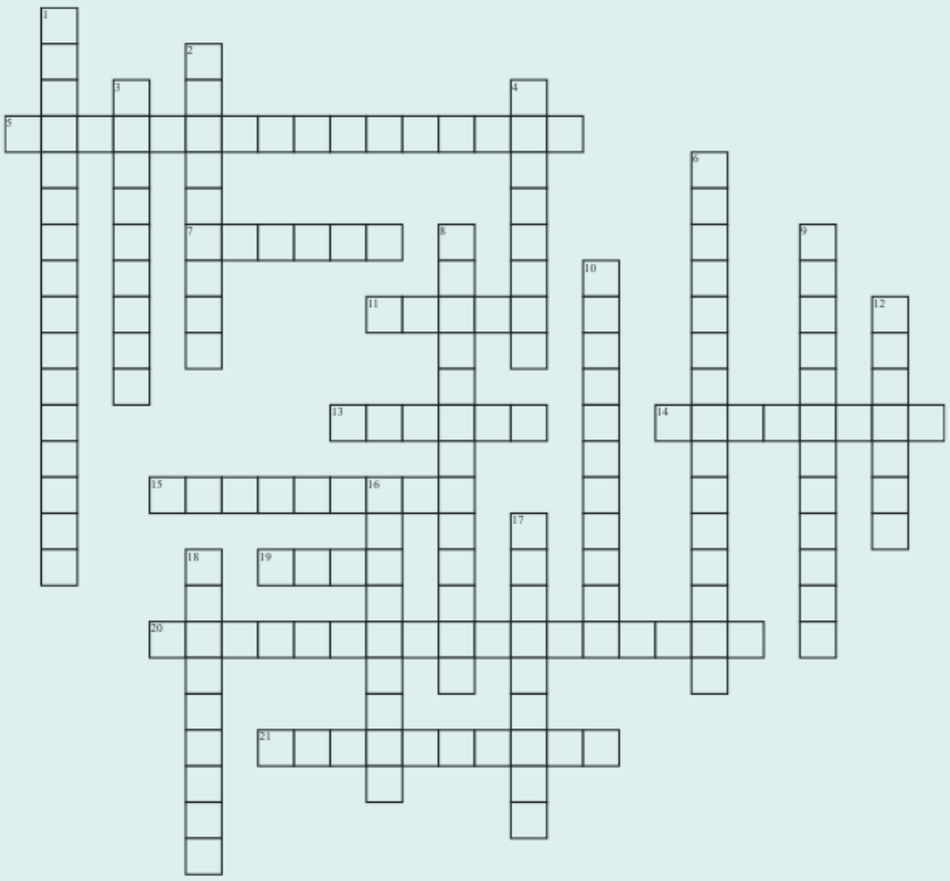
THE AGRICULTURAL REVOLUTION



Across

5. the agricultural reformist that invented the four crop rotation system

7. up to the 1730's cattle were often slaughtered in the winter because of lack of food, also known as

11. new machinery still had to be pulled by

13. one field in three left empty meant it was

14. the four-crop rotation system allowed this nutrient to be replaced in the soil

15. More animals grazing the land meant more ' ' fertilized the soil

19. an increase in the size of animals meant this food source was more readily available

20. The process by which the largest animals on a farm were mated to produce offspring

21. Farmers did not have

Down

1. In 1834, Cyrus McCormick invented a

2. Greater amounts of ' ' in Britain led to an increase in population

3. better fertilized soil meant an increase in

4. surrounding fields with fences meant the fields were now

6. those displaced by less labor available moved to

8. The four-crop rotation system is also known as the

9. One of the main drawbacks in agriculture before the revolution was

10. the changes that took place meant that fewer workers were needed to work in

12. surrounding the fields fences and hedges prevented the spread of

16. leaving fields empty allowed soil to regain

17. with more food available, the number of farm animals

18. This invention allowed seeds to be sewn in straight lines with no waste

Activity I - World Café Discussion

Activity Title: Strengthening Agroecological Systems through the Conservation and Use of Landraces

Objective:

This World Café activity will facilitate meaningful conversations among participants on the role of landraces in strengthening agroecological systems. Participants will explore conservation practices, challenges, opportunities, and future strategies for integrating landraces into sustainable agricultural systems.

Format:

The World Café will be conducted in three rounds, each focusing on a different aspect of landrace integration into agroecology. Participants will rotate between tables, allowing for diverse perspectives and collaborative dialogue.

Round 1	Round 2	Round 3
Table Host		
Dr Carlo Fadda	Dr Chandrashekhar M Biradar	Dr Fergus L. Sinclair
Contributors:		
Elly Ouma Atieno	Dr Jai Rana	Dr Rakesh Chahota
Dr Jahir Basha	Alexander Heer	Pran Ranjan
Dr Aqeel Hasan Rizvi	Dr Ranbir Singh	Veronica Massawe
Dr Rashmi Yadav	Rashmi Alias	Gopal Kumar
Dr T V Krishna	Dr Ravishankar Manikam	Dr Ashoka P

Session Breakdown:

Welcome and Introduction (10 minutes):

- Overview: Introduction to the World Café concept and setting the stage for discussion.
- Topic Introduction: "Strengthening Agroecological Systems through the Conservation and Use of Landraces."
- Purpose: To generate ideas on how landraces can be integrated into agroecological systems for resilient and sustainable agriculture.

Round 1: Exploring the Importance of Landraces in Agroecological Systems (20 minutes)

Guiding Questions:

- Why are landraces important for agroecological systems?
- How do landraces contribute to resilience against climate change, pests, and diseases?
- What role do landraces play in maintaining biodiversity in agroecosystems?

Round 2: Conservation Strategies for Landraces (20 minutes)

Guiding Questions:

- What are effective methods for conserving landraces in agroecological systems?
- How can traditional knowledge be preserved and integrated with modern farming practices?
- What role do seed banks, on-farm conservation, and community-driven initiatives play in preserving landraces?

Round 3: Challenges and Opportunities for Landrace Integration (20 minutes)

Guiding Questions:

- What are the main challenges in integrating landraces into modern agricultural systems?
- How can policies, markets, and education support the conservation of landraces?
- What opportunities exist for strengthening market demand for landrace-based products?

Final Reflection (10-15 minutes): Synthesizing Insights and Future Directions

Guiding Questions:

◊ What are the key takeaways from the discussions on the role of landraces in agroecology?

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◊ How can we move forward in strengthening agroecological systems using landraces?

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◊ What actions are needed at the policy, community, and research levels?

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Wrap-Up (5 minutes):

- Vote of Thanks.
- Any actions or next steps that emerge from the conversation.

Outcome:

This activity will foster in-depth discussions and generate actionable insights on how to integrate landraces into agroecological systems, with a focus on enhancing sustainability, resilience, and biodiversity within agricultural landscapes.

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SCRATCH YOUR BRAIN

ENVIRONMENTAL SCIENCE

Z O F U R Z A N N A K G C B R D I V E R S I T Y
B A R R N J Z A O D O Q X X R Z Y Z I E P F W T
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C N X O S Y T E T C C B T E E S K R Q V U T R F
O U G Y A T F E U O Q I J X Z V P B W I Y N W D
L A B I M I J H L M R G N O Z Y T P F R Y E V R
O L W A O S E K L P R L G T B R N W N O T M T O
G T L R I R T Z O O A D A P T A T I O N I E N U
Y N B T B E A U P S G T G M G C S E G M C G O G
D S K V E V R M R E L W T Z H S R L L E V A R H
S J D I R I H W I R W Z F H U H I O D N T N F T
H O W F E D T U A S G O N X P U X K Y T S A D Q
W S W G H O R C L I M A T E M E Y M Z A U M L P
C E O Y P I I T C K U X Z Y D T H F E L R E O N
U R R D S B B E M O I B K P N W U T O S C V C V
D O N N O L Q K Z G R E M U S N O C N C A I M B
I V G K M A E R O B I C H D T G D D A I Q T I U
F I N L T C A R B O N C Y C L E E N M E S P B Q
R N B N A A H B C B G I J O T P L U O N T A O Y
Y R H Q P N G X S K C I X O N A T O U C L D W V
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G W S C A Y I Y S D I C A L Q E Q O P W F N Y B
X W N Q D K G F I K B E Z Y L B E C K E J A R T

ENVIRONMENTAL SCIENCE
ADAPTIVE MANAGEMENT
AIR POLLUTION
CARBON CYCLE
BIODIVERSITY
DECOMPOSERS
BIRTH RATE
ATMOSPHERE
ADAPTATION
CARNIVORES
DIVERSITY
DEW POINT
COLD FRONT
CONSUMER
COMPOUND
ECOLOGY
DROUGHT
AEROBIC
CLIMATE
ANOXIC
KHEERAN
BIOMASS
COMPASS
BIOME
DELTA
CRUST
ANNUAL
ACIDS
CITY
DNA

Activity II - Fish Bowl Session

Activity Title: Driving Food System Change: Empowering Consumers and Growing Organic Markets

Objective:

This interactive fishbowl session explores the critical role of consumers in reshaping food systems and scaling organic markets. Drawing insights from India's diverse agricultural heritage and global experiences, the session aims to bridge local traditions and global innovations to empower communities and expand access to sustainable, healthy, and organic food choices.

Format:

Setup:

- A central "inner circle" (5-7 speakers) for active participants.
- An "outer circle" for observers who can join the discussion when a seat opens up in the inner circle.
- A moderator will guide the discussion, ensuring a balance of global and Indian perspectives.

Rules:

- Participants in the inner circle share ideas, experiences, or challenges.
- Observers can tap in by replacing someone in the inner circle to contribute new insights.
- All participants are encouraged to keep inputs concise (1-2 minutes).

Focus Area 1	Focus Area 2	Focus Area 3
Maestrini Nicoletta	Dr Deepak Chamola	Geetha Ravichandran
Dr Raghavendra	Hariom Nirala	Dr Anuradha M N
Ashok Kumar	Dr Vaibhav Sharma	Pradipta Kishor Chand
Manoj Menon	Kiran Bhaskaran	Dr Dinesh Chauhan
Rangu Rao	Dr Randhir Singh Poswal	Saurabh Sinha
Manoshi Chakrovorty	Mridul Bhargava	Naveen Kumar

Session Breakdown:

Welcome and Introduction (5 minutes):

- Overview: Introduction to the Fishbowl discussion concept and setting the stage for an engaging, interactive dialogue among participants.
- Topic Introduction: Driving Food System Change: Empowering Consumers and Growing Organic Markets.
- Purpose: To engage participants in a focused discussion about empowering consumers to make sustainable choices, enhancing accessibility to organic products, and driving innovations for scaling organic markets while fostering global appeal and local relevance.

Focus Area 1: Enhancing awareness and trust among consumers (15 minutes)

Guiding Question:

What role can education and campaigns play in promoting organic consumption

Subtopics for discussion:

- Addressing consumer misconceptions about organic products.
- The role of labelling, certifications, and transparency.
- Leveraging digital platforms to reach and educate consumers.

Focus Area 2: Scaling up organic production and market reach (15 minutes)

Guiding Question:

What innovative models can bridge the gap between organic producers and urban/rural consumers?

Subtopics for discussion:

- Building shorter, resilient supply chains (farm-to-fork models).
- Public-private partnerships in scaling organic markets.
- Incentives for smallholder farmers to adopt organic practices.

Focus Area 3: Consumer-Producer links for sustained market growth (15 minutes)

Guiding Question:

How can consumer-driven demand influence producers to adopt sustainable practices?

Subtopics for discussion:

- Role of farmer-producer organizations and farmer markets.

- Building consumer loyalty through storytelling and farm-to-table narratives.
- Examples of successful regional or national organic market models.

Final Reflection (10 minutes):

Key Takeaways

1. Challenges Identified:

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2. Solutions Proposed:

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3. Key Insights (Global and Local):

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4. Actionable Steps for Participants:

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Wrap-Up (5 minutes):

- Vote of Thanks.
- Participants suggest follow-up actions or collaborations.

Outcome:

The session will provide actionable insights into scaling organic markets, enhancing consumer awareness, fostering efficient value chains, and strengthening local food systems, ultimately bridging gaps between producers and consumers for sustainable transformation.

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List of Speakers - Moderators

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33	Mrs Shilpa	Data Entry Operator, Commissionerate of Agriculture
34	Mr Nagaraj	Data Entry Operator, Commissionerate of Agriculture
35	Mrs Bhagyashree N.R.	Data Entry Operator, Commissionerate of Agriculture
36	Mr Rahman	Supporting Staff, Commissionerate of Agriculture
37	Mrs Shilpa	Supporting Staff, Commissionerate of Agriculture
38	Mrs Nandini	Supporting Staff, Commissionerate of Agriculture

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SOIL

S T N E I R T U N Y U B A E I S S F X R R Y H J
K H T A G L T N P T H P P C N A D Z O O V M E I
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M G U E Y B L U E Q Y B R E O J N T Q W T R W J
O K Y R P K D T N G V D T N N U S Q D A N Q H W
O I W D X N V R B P Y V I G V I Z W T J T C S Z
W A O I N X I A C N L U C I V N L D T U J I D Y
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W V Z C P V I R V L N A L S G S S H D W A N M G
R P W E O N E H R B N D T A E L I O S P R I R T
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D L E E N K R S I S C O H M T S F L Y G N C T G
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organic matter
mycorrhizae
airpockets
nutrients
particles
organisms
minerals
alkaline
fertile
neutral
insects
bedrock
subsoil
topsoil
chalky
stony
roots
worms
water
peaty
loamy
silty
sandy
acid
clay
soil

SCRATCH YOUR BRAIN

Properties of Soil Word Search

I	T	S	W	X	C	J	I	B	S	C	U	K	X	R	Z	T
E	R	X	B	E	W	C	H	P	O	R	O	S	I	T	Y	J
G	Y	U	H	A	Z	N	H	H	Y	O	Z	M	Q	Z	U	H
O	N	U	T	R	I	E	N	T	S	A	G	C	L	N	F	G
M	L	W	A	T	R	U	P	Q	F	L	N	I	X	D	P	M
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M	O	J	S	W	M	R	A	D	N	A	N	M	R	E	F	N
L	T	J	P	O	D	A	C	U	D	L	Q	A	G	E	S	E
C	B	Z	H	R	C	L	T	I	B	I	S	B	A	O	S	R
H	A	Z	E	M	J	L	E	Z	D	N	K	S	N	X	Z	A
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I	E	R	G	H	F	Z	A	E	S	E	D	J	M	H	B	L
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C	K	O	F	X	U	P	J	G	R	C	U	P	L	J	L	E
E	X	W	G	N	K	P	A	T	E	X	T	U	R	E	M	O
U	G	H	P	A	R	T	I	C	L	E	S	K	H	Z	G	P

AGGREGATE
ORGANIC MATTER
NUTRIENTS
EARTHWORM
FRIABLE

STRUCTURE
ALKALINE
POROSITY
CHEMISTRY
TEXTURE

DRAINAGE
MINERALS
BACTERIA
PARTICLES
NEUTRAL

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