UMIAM DECLARATION

ON MANAGING AGROBIODIVERSITY IN NORTH-EASTERN INDIA

Adopted in the

National Conference on Managing Agrobiodiversity in North-Eastern India

From Biodiversity to Bio-wealth

October 23–25, 2024

Venue

ICAR Research Complex for North Eastern Hill Region, Umiam, Meghalaya

Co-organizers

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Indian Society of Plant Genetic Resources (ISPGR), New Delhi
ICAR Research Complex for North Eastern Hill Region (ICAR-RCNEH), Umiam, Meghalaya
ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi

Co-organizers

Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA), New Delhi
Alliance for Bioversity International and CIAT, New Delhi
Trust for Advancement of Agricultural Science (TAAS), New Delhi
ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-VI, Guwahati, Assam
ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-VII, Umiam, Meghalaya
ICAR-National Research Centre on Orchids (ICAR-NRCO), Pakyong, Sikkim

Sponsors

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Preface

North-Eastern India stands as one of the richest reservoirs of agrobiodiversity in the world, harbouring a unique and diverse range of plant, animal, and microbial genetic resources. This biodiversity not only underpins the region's agricultural systems and food cultures but also plays a critical role in ensuring ecological stability, nutritional security, and the livelihoods of millions of small and marginal farmers. Despite being self-sufficient in food production, the region faces challenges such as protein-energy malnutrition, micronutrient deficiencies, and the gradual erosion of its rich genetic heritage due to factors like deforestation, climate change, and infrastructural development.

Recognizing the urgency of these issues and the need for sustainable management of the region's vast biological wealth, the Indian Society of Plant Genetic Resources (ISPGR), New Delhi, in collaboration with ICAR Research Complex for NEH Region, Umiam, Meghalaya, and ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi, organized the **National Conference on Managing Agro-biodiversity in North Eastern India — From Biodiversity to Bio-wealth (NCMAN-2024)**. The conference served as a vital platform for dialogue among scientists, policymakers, farmers, entrepreneurs, and other stakeholders to deliberate on current challenges and opportunities related to agrobiodiversity conservation and utilization. The event brought together over 250 delegates, including representatives from ICAR and its institutes, PPV&FRA, international research organizations (Alliance Bioversity-CIAT, ICARDA, ICRISAT), Central/State Universities, CSIR, Meghalaya Biodiversity Board, Directorate of Animal Husbandry & Veterinary, NABARD, other Meghalaya government agencies, the Tea Research Institute, etc.

This document, designated **Umiam Declaration,** is the outcome of intensive discussions and consultations held during the conference. It encapsulates the collective vision, concerns, and commitments of stakeholders towards conserving and utilizing the agrobiodiversity of North-eastern India for sustainable agriculture, enhanced livelihoods, and nutritional well-being. It outlines not only the region's current challenges but also a range of viable opportunities, innovative strategies, policy interventions, and community-driven approaches needed to transform agrobiodiversity into a pillar of development.

(Editors)

Acknowledgements

The organizers of NCMAN-2024 place on record sincere gratitude to Hon'ble Governor of Meghalaya, Shri C.H. Vijayashankar ji for gracing the Inaugural Session of NCMAN-2024 and sharing his words of wisdom, while also assuring his full support in implementing the recommendations emanating from the event.

We are deeply indebted to Dr R.S. Paroda, Padma Bhushan Awardee, Founder and Current President of ISPGR, and Chairman, Trust for Advancement of Agricultural Sciences (TAAS), for being the driving force behind the organization of the Conference and all other activities of ISPGR.

Support and encouragement by Dr Himanshu Pathak, Secretary, Department of Agricultural Research and Education (DARE) and Director General, Indian Council of Agricultural Research (ICAR); all Deputy Director Generals (DDGs) of ICAR and Director, ICAR-National Bureau of Plant Genetic Resources (ICAR-NBPGR) towards organization of this Conference is gratefully acknowledged.

Benign presence of several luminaries in the field of agricultural research, education and extension as Guests of Honour and/or Chairs of Session enhanced the quality of deliberations in NCMAN-2024. We are very thankful to Dr T. Mohapatra, Chairman, Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA), Dr Sanjay Kumar, Chairperson, Agricultural Scientists Recruitment Board (ASRB), Dr K.M. Bujarbaruah, Vice President, National Academy of Agricultural Sciences (NAAS), Dr P.L. Gautam, Chancellor, Dr Rajendra Prasad Central Agricultural University (RPCAU), Dr Prabha Shankar Shukla, Vice Chancellor, North-Eastern Hill University (NEHU), Dr B.C. Deka, Vice Chancellor, Assam Agricultural University (AAU), Jorhat, Assam, Dr R.C. Agrawal, DDG (Agricultural Education), ICAR and Dr J.K. Jena, DDG (Fisheries Science), ICAR. Stalwarts in niche areas also ably led the technical sessions and we are thankful to each one — Dr Kuldeep Singh, Head, Genebank, ICRISAT; Dr Sunil Archak, Professor (PGR) & Office-in-Charge, Germplasm Exchange and Policy Unit (OIC, GEPU), ICAR-NBPGR, Dr B.P. Mishra, Director, National Bureau of Animal Genetic Resources (NBAGR); Dr P.K. Pandey, Director, Directorate of Cold Fisheries Research (DCWF), Dr O.P. Chaurasia, Director, Defence Research and Development Organization-Deference Institute of High Altitute Research (DRDO-DIHAR); Dr D.K. Agarwal, Registrar-General, PPV&FRA; Dr J.C. Rana, Country Director, Alliance for Bioversity International & CIAT; Dr Lakshmi Kant, Director, ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR-VPKAS), Almora; Dr A.K. Mohanty, Director, ICAR-

Agricultural Technology Application Research Institute (ICAR–ATARI), Umiam; Dr S.P. Das, Director, ICAR-National Research Centre on Orchids (ICAR-NRCO), Pakyong, Sikkim; Dr G Kadirvel, Director, ICAR-ATARI, Guwahati, Dr B.K. Sohaliya, Chairman, Farmers (Empowerment) Commission, Government of Meghalaya.

We profoundly thank Dr V.K. Mishra, Director, ICAR-Research Complex for NEH Region (ICAR-RCNEH), Umiam, & Conference Coordinator, for readily agreeing to host the National Conference, and providing dynamic leadership for immense technical and administrative support through his dedicated team. We thank all the members of national and local organizing committees for their help in smooth conduct of the event.

We thank all delegates, speakers, Co-Chairs and Convenors who joined the event and made it a grand success Thanks are accorded to the entire Executive Council of Indian Society of Plant Genetic Resources (ISPGR) for their support in various ways. Special thanks to Dr R.K. Tyagi, Vice President, ISPGR, for his efforts organization and compilation of this document. Dr Veerendra Verma, Councillor (East Zone) & Organizing Secretary, and his team, especially Dr Amit Kumar provided the crucial technical and logistic support for the event. Help provided by staff of ISPGR (Mr Sunil Bhardwaj and Mr Arup Das) in logistic matters is sincerely appreciated. The financial support from ICAR, New Delhi; PPV&FRA, New Delhi; Alliance for Bioversity International and CIAT, New Delhi; International Center for Agricultural Research in the Dry Areas (ICARDA), New Delhi; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, Telangana; ICAR-ATARI, Zone-VI, Guwahati, Assam; ICAR-ATARI, Zone-VII, Umiam, Meghalaya; ICAR-NRCO, Pakyong, Sikkim; Meghalya Biodiversity Board, Shillong, Meghalaya; Directorate of Animal Husbandry & Veterinary, Shillong, Meghalaya; National Bank for Agriculture and Rural Development (NABARD), Shillong, Meghalaya; is gratefully acknowledged.

The success of the meeting was also due to enormous support provided by distinguished Co-Chairs, Speakers, Panellists and Moderators, each of whom is gratefully acknowledged. Finally, we thank all dignitaries and delegates who participated in the webinar. We hope this declaration serves as a guiding framework for researchers, development practitioners, and policymakers, encouraging coordinated action to harness the full potential of North-eastern India's genetic wealth in alignment with national priorities.

Veerendra Kumar Verma
Organizing Secretary, NCMAN—2024

Anuradha Agrawal
General Secretary, ISPGR

Background and Context

North-eastern India, with 25.5 million hectares of the total geographical area, encompassing 8 states, *viz*., Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, and Sikkim. About 70% of the population in the region is dependent on agriculture, with land holding ranging from 0.005 to 4.0 hectares, and about 80% of them are marginal and small farmers. The region is almost self-sufficient in food security, but the majority of the population, especially children and women, suffer from protein and energy malnutrition, and micronutrient (vitamin and minerals)-related disorders, which are essential for sustaining healthy life.

The region possesses a diverse climate, varying from tropical to alpine, favourable for the existence of diverse plant species, including wild and cultivated species. Hence, the region is designated as a 'hot spot' for biodiversity. Although, the region shares only 7.7% of India's geographical area, but it contributes 21.67% of the national forest cover, 50% (8000 species) of the flowering plants, 39% (7,000 plant species) of higher plants, and 37% (300 species) of the wild edible plants in India. Furthermore, the region is considered the primary center of origin for crop species like rice, mandarin, banana, cucumber, brinjal, Indian bean, ginger, turmeric, large cardamom, taro, yam, bamboo, orchid, lily, and a secondary center of diversity for maize, chillies, chow-chow, beans, etc. Besides, many underutilized crops like perilla, job's tear, faba bean, winged bean, rice bean, lima bean, sword bean, tree bean, tree tomato, edible mushrooms, ferns, lotus, *etc*. are grown by the local tribes and play an important role in ensuring the nutritional security of the local population. The region is also known for superior quality of the produce. Geographical Indications (GI) tags have been granted for several agricultural crops/commodities, such as, *Joha* rice, *Boka Chaul*, *Kaji Nemu*, Tezpur Litchi, and *Karbi* ginger of Assam; *Adi Kekir* ginger and *Khaw Tai* (*Khamti* rice) of Arunachal Pradesh; black rice (*Chakhao*), Tamenglong Orange, Sirarakhong's Hathei chilli, *Kachai* lemon, and Siroy lily of Manipur; Memong Narang and Khasi Mandarin of Meghalaya; Large Cardamom and Dalle chillies of Sikkim; King-chillies, Tree tomato and weet cucumber of Nagaland; Birds eye chillies of Mizoram; and Queen pineapple of Tripura. Besides crop species, the region is also rich in diverse landraces of livestock such as *Siri* (Sikkim and West Bengal), *Lakhimi* (Assam), *Thutho* (Nagaland), *Masilum* (Meghalaya) breed of the cattles; Chittagong (Meghalaya & Tripura), *Miri* and *Daothigir* (Assam), *Kaunayen*

(Manipur) breeds of chicken, *Sumi-Ne* (Nagaland), Assam Hill (Assam & Meghalaya) of goat, *Niang Megha* (Meghalaya), *Tenyi Vo* (Nagaland), *Doom* (Assam), *Mali* (Tripura), *Manipuri Black* (Manipur) and *Wak Chambil* (Meghalaya) breed of pig and have been registered due to their unique traits. The region is also known for the diverse fish genetic resources including 197 potential foods, sports and aquarium fish species belonging to 27 families under 74 genera and 33 has been found endemic to the region.

Integrated farming systems are the main traditional farming practices in the region. However, the growing demands for food due to the increasing population possess challenges to food and nutritional security. The loss of biodiversity due to deforestation, mining, shrinking of the wetland, biotic and abiotic stresses, and climate change further aggravated the problems. These emerging challenges are of grave concern for the loss of biodiversity as well as food and nutritional security of the region. The target of food and nutritional security, *i.e.*, zero hunger and poverty by 2030 as envisioned in the Sustainable Development Goals (SDGs) of United Nations, can be achieved only through new innovations and the full potential utilization of vast genetic resources to address issues of declining factor productivity such as soil health, water availability, incidences of diseases and pests, energy crises, livelihood security of small holders, and emerging challenges of climate change. To promote economic, strategic and cultural relations with the vast Asia-Pacific region under the Act East Policy, the Government of India has taken several initiatives, like the development of infrastructure related to road, railways and other means of connectivity which may likely to cause erosion of genetic diversity to certain extent. To conserve the vast genetic diversity present in the region, urgent steps should be taken to address the emerging challenges and threats.

Despite its agricultural self-sufficiency, North-East (NE) region faces persistent challenges of protein-energy malnutrition and micronutrient deficiencies, particularly among women and children. The region's rich agrobiodiversity offers immense potential to address these issues, enhance nutritional security, and support sustainable livelihoods. However, emerging threats such as deforestation, climate change, and infrastructure development under India's Act East Policy risk eroding this genetic wealth.

CHALLENGES

1. **Loss of Biodiversity**: The loss of biodiversity is a critical concern, impacting ecosystems and the availability of wild edible plants and crop wild relatives (CWRs). This decline threatens the genetic diversity necessary for resilient agriculture and ecosystem stability.

2. **Deforestation and Land Use Changes**: Rapid deforestation driven by agriculture expansion, mining, and infrastructure projects such as roads and railways under the Act East Policy is significantly reducing forest cover. This deforestation not only destroys habitats but also endangers wild edible plants and CWRs vital for food security and ecological balance in this region. The clearing of forests for development and agricultural land to meet growing population demands exacerbates this problem, leading to habitat fragmentation and loss of biodiversity.
3. **Shrinking Wetlands**: Wetland ecosystems, which are crucial for maintaining fish diversity and aquatic plants, are declining due to urbanization and agricultural expansion. This reduction threatens aquatic biodiversity and the livelihoods dependent on these ecosystems.
4. **Climate Change**: Changes in temperature and precipitation patterns caused by climate change are adversely affecting crop yields, livestock health, and fish habitats. Tropical ecosystems are particularly vulnerable, facing shifts that disrupt traditional agricultural and ecological systems.
5. **Biotic and Abiotic Stresses**: Agricultural productivity is challenged by increasing incidences of biotic stresses such as pests, diseases, viruses, fungi, bacteria, insects, and nematodes, as well as abiotic stresses including salinity, drought, flooding, temperature extremes, and soil degradation. These stresses affect plant growth, reproduction, and yield, posing significant risks especially to smallholder farmers with limited resources. Managing these stresses involves understanding plant physiological and biochemical responses and developing resistant crop varieties and sustainable interventions.
6. **Food and Nutritional Insecurity**: Despite achieving food self-sufficiency, about 80% of marginal and small farmers suffer from protein-energy malnutrition and micronutrient deficiencies, including iron, zinc, and vitamin A. Millets and underutilized legume crops like winged bean, lima bean, rice bean, tree bean along with wild edible plants, have the potential to address these nutritional gaps but remain under-researched and under-promoted, limiting their contribution to dietary diversity and food security.
7. **Socio-Economic Constraints**: Small landholdings, ranging from 0.005 to 4.0 hectares, restrict farmers' ability to adopt modern technologies or scale up production. Limited infrastructure and market access hinder the commercialization of Geographical Indication (GI)-tagged products such as *Khasi* Mandarin and *Kachai* lemon, reducing income opportunities. Additionally, rural youth migration to urban areas is depleting the agricultural workforce and threatening the transmission of traditional agricultural knowledge.

8. **Policy and Institutional Gaps**: Conservation laws like the Biological Diversity Act, 2002 (BDA) and the Protection of Plant Varieties and Farmers' Rights Act, 2001 (PPV&FRA) are not strongly implemented, limiting protection for local landraces and traditional knowledge. *Ex situ* conservation efforts are inadequate due to limited seed banks and cryopreservation facilities, impeding genetic resource conservation. Furthermore, mechanisms for Access and Benefit Sharing (ABS) are poorly enforced, discouraging community-led conservation initiatives.
9. **Deficits of Knowledge and Awareness**: Traditional knowledge related to underutilized crops and ethnobotanical practices is rapidly eroding due to modernization and insufficient documentation. Public awareness about the nutritional and economic benefits of agrobiodiversity remains low, which restricts its integration into mainstream agricultural practices and policies.

These challenges collectively threaten biodiversity, food security, and sustainable agricultural development, necessitating integrated approaches that combine conservation, research, policy enforcement, and community engagement. Despite the several challenges, NE region offers great opportunities, as described below:

OPPORTUNITIES

1. **Leveraging Agrobiodiversity for Nutritional Security**: There is significant potential to leverage agrobiodiversity to improve nutritional security by promoting millets and underutilized/potential crops such as buckwheat, job's tear, winged bean, lima bean, rice bean, tree bean, blood fruit and tree tomato. These crops are rich sources of proteins, vitamins, and minerals, making them excellent candidates to combat malnutrition, especially among vulnerable populations. Additionally, developing fortified food products using GI-tagged crops like *Chakhao* black rice can enhance dietary diversity while simultaneously increasing the market value of these unique agricultural products. Such initiatives can help address micronutrient deficiencies and improve overall health outcomes.
2. **Innovations for Conservation and Utilization**: Advances in biotechnology and artificial intelligence (AI) offer promising tools for agrobiodiversity conservation and utilization. Genomic tools can be employed for trait discovery, such as developing drought-resistant rice varieties that are better adapted to changing climatic conditions. AI can support precision agriculture practices, optimizing resource use and improving crop resilience. Expanding *ex situ* conservation efforts by establishing more seed banks, *in vitro* culture, and cryopreservation facilities

is essential to safeguard genetic diversity for future generations. Furthermore, geo-informatics and digital tools like Geographic Information Systems (GIS) and Information and Communication Technology (ICT) platforms can be used to map biodiversity hotspots and monitor genetic erosion, enabling more targeted conservation strategies.

3. **Community-Led On-Farm Conservation**: Empowering local communities, Farmer Producer Organizations (FPOs), and Krishi Vigyan Kendras (KVKs) to engage in on-farm conservation of landraces and CWRs presents a valuable opportunity. These stakeholders play a crucial role in maintaining agrobiodiversity in natural settings, ensuring the survival of traditional varieties adapted to local conditions. Recognizing and rewarding custodians of traditional knowledge through mechanisms such as the PPV&FRA and GI certifications can incentivize conservation efforts and promote sustainable practices.
4. **Entrepreneurship and Value Addition**: Supporting youth and women-led enterprises focused on processing and marketing agrobiodiversity-based products, such as turmeric powder and fermented fish products, can stimulate rural economies and create livelihoods. Developing robust value chains for GI-tagged products will facilitate access to national and international markets, thereby, boosting smallholder farmers' incomes and encouraging the sustainable production of unique agricultural commodities. These initiatives can also promote innovation and entrepreneurship within rural communities.
5. **Policy and Legal Frameworks**: Strengthening Access and Benefit Sharing (ABS) mechanisms under the BDA is crucial to ensure equitable sharing of benefits with indigenous and local communities who conserve genetic resources. Promoting GI tags and intellectual property rights (IPRs) for unique landraces and livestock breeds can enhance their economic value and provide legal protection against biopiracy. These policy measures will support conservation efforts while empowering communities economically.
6. **Capacity Building and Awareness**: Integrating agrobiodiversity conservation into educational curricula and agricultural extension services can engage youth and farmers, fostering a new generation of conservationists and practitioners. Utilizing media campaigns, front-line demonstrations (FLDs), and digital platforms can raise public awareness about the nutritional, ecological, and economic benefits of agrobiodiversity. Enhanced knowledge dissemination will encourage broader adoption of conservation-friendly farming practices.
7. **Regional and Global Collaboration**: India's Act East Policy offers an opportunity to foster cross-border exchange of genetic resources and traditional knowledge with Asia-Pacific countries, provided that ABS protocols are strictly followed.

Collaborations with international organizations such as Bioversity International can bring in funding, technical expertise, and innovative conservation strategies. Such regional and global partnerships will strengthen conservation programs and promote sustainable use of agrobiodiversity on a larger scale.

SOME PAST SUCCESS STORIES

1. **GI-Tagged Crops Enhancing Livelihoods**: The GI tagging of crops has played a significant role in enhancing the livelihoods of farmers across various regions in India. For instance, the *Kachai* lemon from Manipur, which has received GI status, has significantly boosted farmer incomes by opening up export markets. Community-led cooperatives have been instrumental in maintaining quality control, ensuring the product's reputation and marketability remain high. Similarly, the *Tezpur litchi* of Assam has benefited from effective branding and strengthened market linkages, which have increased demand and provided economic stability to smallholder farmers. In Sikkim, the large cardamom has gained organic certification alongside its GI status, positioning it as a premium product in international markets, including the Middle East and Europe. These success stories illustrate how GI tags can elevate local products to global recognition while improving farmer welfare.
2. **Community-Led Conservation**: Community involvement has been central to the conservation of unique agrobiodiversity. The *Adi* community in Arunachal Pradesh has conserved the *Adi Kekir* ginger, preserving its genetic purity and securing a GI tag that supports local livelihoods. In Meghalaya, community seed banks in the *Khasi* and *Garo* hills have played a crucial role in conserving landraces of rice and millets. These seed banks ensure seed security, particularly during climate-induced crop failures, by maintaining the availability of diverse and resilient crop varieties. Such community-led conservation efforts not only protect biodiversity but also empower local populations to sustain their agricultural heritage.
3. **Entrepreneurship and Value Addition**: Entrepreneurial initiatives have successfully added value to traditional crops, creating employment and enhancing nutrition. In Manipur, women-led enterprises have developed value-added products from *Chakhao* black rice, including black rice flour and snacks. These products have created jobs and improved nutritional access within the community. In Tripura, farmer cooperatives have established processing units for the Queen pineapple, producing pineapple juice and jams likewise, as well as processing and packaging of the raw jack fruits in Garo Hills, Meghalaya. A significant impact has also been observed on livelihood improvement through

value addition to kiwi produce in the Ziro Valley of Arunachal Pradesh. These processing efforts have reduced post-harvest losses and increased farmers' incomes by extending the shelf life and market reach of their produce. These examples highlight how value addition and entrepreneurship can transform traditional agricultural products into economically viable commodities.

4. **Livestock and Fisheries Conservation**: Conservation efforts extend beyond crops to include livestock and fisheries. In Sikkim, community breeding programs have successfully revived the *Siri* cattle population, a breed valued for its adaptability to hilly terrains and high milk fat content. This revival supports both biodiversity and local dairy economies. In Assam, local fishermen have conserved endemic fish species such as *Chitala chitala* through sustainable fishing practices and hatchery development. These initiatives help maintain aquatic biodiversity while supporting the livelihoods of fishing communities.
5. **Traditional Knowledge Documentation**: The documentation and recognition of traditional knowledge have contributed to the inclusion of underutilized wild edibles in nutrition programs. In Nagaland, ethno-botanical studies have recorded traditional uses of wild plants like tree tomato and ferns, leading to their integration into nutritional initiatives that benefit rural women and children. Similarly, the Mizo Bird's Eye Chilli from Mizoram has gained a GI tag by recognizing traditional cultivation practices. This recognition has enhanced the chilli's marketability and helped preserve the cultural heritage associated with its production. These efforts demonstrate the importance of safeguarding indigenous knowledge to promote both cultural identity and sustainable use of biodiversity.

ABOUT THE CONFERENCE

Indian Society of Plant Genetic Resources (ISPGR), New Delhi in collaboration with ICAR Research Complex for NEH Region, Umiam, Meghalaya and ICAR-National Bureau of Plant Genetic Resources (NBPGR), New Delhi, organized a National Conference on Managing Agro-biodiversity in North Eastern India (NCMAN-2024) aiming to (i) provide an opportunity to researchers, academicians, policy makers, students and farmers to present their research results, views and suggestions relating to current developments in the area of genetic diversity management and develop the roadmap for future, and (ii) sensitize all the stakeholders for innovative conservation and utilization of the diverse genetic resources of the region for sustainable agriculture and the way forward of genetic resources-led livelihood and nutritional security for resource-poor farmers and consumers. NCMAN-2024 also aimed to address the agrobiodiversity management challenges faced by this region, by fostering dialogue

among researchers, policymakers, farmers, and stakeholders to develop a roadmap for conserving and utilizing agrobiodiversity for sustainable agriculture and bio-wealth creation, aligning with the United Nations' Sustainable Development Goals (SDGs) of zero hunger and poverty by 2030. The Conference comprised following themes and sub-themes:

1. **Biodiversity for Food and Agriculture including Animals and Fisheries**

   Sub-themes: Status, ethno-botany, traditional knowledge, collection, evaluation, characterization etc.

2. **Innovations and Modern Tools for *Ex Situ* Conservation and Utilization**

   Sub-themes: Biotechnology tools for trait discovery to address climate change, ex-situ conservation (seed, *in vitro*, cryo), geo-informatics, digital sequence information (DSI), artificial intelligence (AI), and information and communication technology (ICT)/digital technology.

3. ***In situ*/On-Farm Conservation by Local Communities**

   Sub-themes: Role of communities, farmers, Krishi Vigyan Kendras (KVKs), Non-Governmental Organizations (NGOs), Farmer Producer Organizations (FPOs).

4. **Access, Exchange, Benefit Sharing and IPR Systems**

   Sub-themes: Intellectual Property Rights (IPRs), Protection of Plant Varieties and Farmers' Rights Act (PPV&FRA), Biological Diversity Act (BDA), Patent, Geographical Indications (GI), Genetic Stock, Registration, National/International Legal Instrument for Access and Benefit Sharing (ABS), Transboundary Movement/ Exchange.

5. **Entrepreneurship and Value Addition**

   Success stories - Food products, production, marketing issues, role of youth and women

6. **Capacity Building and Public Awareness**

   Educational curricula, awareness through media communication, front line demonstrations (FLDs).

During the Conference, experts made presentations, discussed and deliberated the issues related to agrobiodiversity management in NE region. Emanated from the detailed discussion, an "*Umiam Declaration*" was adopted by all to implement a Road Map for efficient agrobiodiversity management in NE India, which is described in subsequent pages.

Umiam Declaration

Recognizing the Critical Role of Agrobiodiversity in North-Eastern India for Food and Nutritional Security, Ecological Balance and Economic Prosperity

We, the participants of the 'National Conference on Managing Agrobiodiversity in North-Eastern India' (NCMAN-2024), convened at ICAR Research Complex for North East Hill Region, Umiam, Meghalaya, from 23-25 October, 2024; acknowledge the utmost importance to agrobiodiversity for sustaining the region's food and nutritional security, livelihoods, and ecological balance. In light of the pressing challenges posed by population growth, climate change, natural resource depletion and globalization, we recognize the urgent need to systematically document, conserve and sustainably use available agrobiodiversity resources. By harnessing the potential of rich genetic diversity of NE India, we are confident to enhance food security, improve nutrition, and create enormous sustainable livelihood opportunities.

We, therefore, commit to implement the following "Umiam Declaration":

1. **Recognition of Agrobiodiversity:** We recognize the critical role of agrobiodiversity in ensuring food security, livelihoods, and ecological balance in NE India. This region, a globally recognized biodiversity hotspot, harbors a unique and irreplaceable wealth of genetic resources. Despite the past efforts to explore and collect some of these resources much remains unknown and underutilized. Given the pressing threats of climate change, habitat loss, and the erosion of traditional knowledge, we urge to launch urgently the comprehensive expeditions in the remote and under-explored regions by all state/national R&D institutions and Agricultural Universities (AUs) and local communities to collect, evaluate and safeguard valuable genetic resources.
2. **Comprehensive Inventory and Documentation:** We recommend that the Indian Society of Plant Genetic Resources (ISPGR) spearhead the development of a comprehensive book on available genetic resources of the NE region. This book should include a detailed and up-to-date inventory of the region's genetic resources, analysis of diversity within and between populations of key species, and prioritization of priority species and breed based on unique traits and

a 'Way Forward' for conservation and sustainable utilization of prioritized species

3. **Strengthen Research and Development:** We commit to strengthening research and development efforts, focusing on the scientific evaluation, conservation, and utilization of NE India's unique agrobiodiversity. A mission-mode project engaging all relevant institutions in the region. ICAR-NBPGR to play facilitation role. This project should prioritize research on unique genetic materials and varieties relevant to local food/fodder systems, spices and medicinal plants. Furthermore, research should focus on developing and implementing innovative conservation techniques, including biotechnology, cryopreservation, and digital technologies. International collaboration with institutions like Alliance of Bioversity International and CIAT is encouraged to support these efforts.
4. **Conservation and Sustainable Use:** We advocate for the conservation and sustainable utilization of agrobiodiversity resources in the region, promoting their access and equitable sharing of benefits arising from their utilization, in line with the national legislations and global agreements. Accordingly, it is urged that all State Biodiversity Boards are made both effective and functional with a provision of adequate funding, inducting eminent experts on a regular basis. For *in situ* conservation, community-based conservation is stressed. We support the concept of participatory conservation through local communities in prioritized crops/breeds, urge funding support from the Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) and other relevant departments for these initiatives.
5. **Innovations and Modern Tools:** We urge the promotion and adoption of innovative technologies and modern tools including biotechnology, cryopreservation, digital and space technology for cataloguing, characterization, documentation, *ex situ* conservation and sustainable management of agrobiodiversity. We also encourage local communities to engage in on-farm conservation practices, leveraging traditional knowledge and biodiversity management practices. In this context, technical and funding support by ICAR and Alliance of Bioversity International and CIAT is considered important.
6. **Intellectual Property Rights and Benefit Sharing:** We support the development of robust intellectual property rights (IPR) systems that protect local varieties, traditional knowledge and innovations associated with agrobiodiversity while ensuring farmers' rights. A proactive approach is necessary to register that all farmers' varieties from different states in the NE region registered with the PPV&FR Authority. We recognize the significant potential of Geographical Indicator (GI)-tagged crops in transforming biodiversity into economic value for farmers, communities, and for rural development. Here, concerted efforts are

needed to promote value addition and marketing of GI-tagged crops through public-private partnerships, supported well by state governments, Biological Diversity Authority, PPV&FR Authority, Indian Council of Agricultural Research, Council for Scientific & Industrial Research, and the Ministry of Agriculture and Farmers' Welfare.

7. **Protecting Unique Livestock Breeds, Fish and Microbes:** To safeguard unique livestock breeds, fish species and agriculturally useful microbes, we recommend the prompt enactment of a law similar to the PPV&FR Act, 2001 by the Ministry of Fisheries, Animal Husbandry and Dairying, in the best national interest. Urgent priority should be given to the registration of bioresources and documentation of these resources in Peoples' Biodiversity Registers (PBRs) by the relevant government departments.
8. **Integrating Biodiversity with Farming Systems:** There is an urgent need to integrate biodiversity into sustainable farming practices to enhance resilience against climate change and improve both productivity and ecosystem services. The research institutes in the region need to prioritize research on unique genetic materials and varieties of the local food systems, spices, and medicinal plants. There is an urgent need to document and popularize the available genetic resources to promote their marketing and export.
9. **Ensuring Quality Planting Material**: The availability of high-quality seed and planting materials, including virus-free saplings of horticultural and medicinal plants, is a critical need of the farmers of this region. We urge that the concerned institutions should be given responsibility of producing and supplying these materials in large quantities. To support these efforts, corpus or revolving funds must be provided.
10. **Development of High-Value Agriculture Sectors:** The NE region's rich biodiversity and favorable climate offer exceptional potential for floriculture, with high-demand flowers like orchids, gerberas, carnations, heliconias, lilies, and chrysanthemums. Realizing this potential requires strategic investment in infrastructure, research and development, market access, value addition, and skill development. Public-private partnerships and active engagement with local communities are essential for the success. Similarly, the NE region's significant ornamental fish diversity accounts for over 85% of India's ornamental fish exports. We advocate for improving the livelihoods of fish farmers for enhancing the exports, by addressing the current challenges and provide appropriate incentives.
11. **Capacity Building and Public Awareness:** We advocate for comprehensive capacity building initiatives for youth, researchers, policymakers, and

communities, focusing on agrobiodiversity and sustainable practices. Public awareness programs and educational materials are crucial to fostering a deeper understanding of the benefits, rights, and responsibilities associated with agrobiodiversity. Collaboration among researchers, government agencies, educational institutions, farming communities and civil society organizations is essential. Regional cooperation and knowledge sharing among NE states are highly encouraged.

12. **Promoting Value Addition and Entrepreneurship:** We encourage entrepreneurship and value addition activities using potential agrobiodiversity resources available to promote local food systems and generate income opportunities.
13. **Documentation and Preservation of Traditional Knowledge:** Recognizing the importance of traditional knowledge associated with agrobiodiversity, same be gathered and documented as PBRs on priority.
14. **Enabling Financial and Policy Support:** We call for supportive policies and regulations that promote sustainable use of agrobiodiversity in NE India. We advocate for special allocation of funds by each state and central government for initiatives related to agrobiodiversity conservation through use in the region. We also advocate for effective integration and coordination of agrobiodiversity conservation initiatives at the national and state development plans to ensure sustainable resource management.

Annexure I

Technical Program

DAY 1: OCTOBER 23, 2024 (WEDNESDAY)

08:45-09:45	**Registration**	
	INAUGURAL SESSION *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	
Chair	**Dr R.S. Paroda**, President, ISPGR and Chairman, TAAS, New Delhi	
Chief Guest	**Shri C.H. Vijayashankar,** Hon'ble Governor, Meghalaya	
Guests of Honour	**Dr T. Mohapatra**, Chairman, PPV&FRA, New Delhi **Dr Sanjay Kumar,** Chairman, ASRB, New Delhi **Dr K.M. Bujarbaruah,** Vice President NAAS & Former VC, AAU, Assam	
Convenor	**Dr Veerendra Kumar Verma,** Organizing Secretary, NCMAN-2024, Shillong, Meghalaya	
10:00-10:08	**Arrival of Dignitaries and Lighting of Lamp**	
10:08-10:15	Welcome and Setting the Context	**Dr V.K. Mishra**, Director, ICAR-RCNEH, Umiam, Meghalaya
10:15-10:23	Addresses by Guests of Honour	**Dr K.M. Bujarbaruah,** Vice President NAAS & Former VC, AAU, Assam
10:23-10:31		**Dr Sanjay Kumar,** Chairman, ASRB, New Delhi
10:31-10:39		**Dr T. Mohapatra**, Chairman, PPV&FRA, New Delhi
10:39-10:50	Chairperson's Address	**Dr R.S. Paroda,** President ISPGR and Chairman, TAAS, New Delhi
10:50-11:00	Conferment of ISPGR Awards by Chief Guest	**Shri C.H. Vijayashankar,** Hon'ble Governor, Meghalaya
	• Honorary Fellow (2023) • Dr S.K. Vasal Award for Efficient Use of PGR (2023) • Dr B.R. Barwale Award for Application/Excellence in PGR (2023) • Dr R.S. Paroda Young Scientist Award (2023) • Dr R.K. Arora Best Paper Award (2023) • Dr K.L. Mehra Memorial Award for Best PGR Student (2023) • Fellows (2023)	

11:00-11:20	**Inaugural Address by Chief Guest**	**Sh. C.H. Vijayashankar,** Hon'ble Governor, Meghalaya
11:20-11:25	**Vote of Thanks**	**Dr Anuradha Agrawal,** General Secretary, ISPGR, New Delhi
11:25-12:00	***Group Photo and Tea/Coffee***	
	PLENARY SESSION *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	
Co-Chairs	**Anupam Mishra,** Vice Chancellor, CAU, Imphal* **Prabha Shankar Shukla**, Vice Chancellor, NEHU, Shillong, Meghalaya	
Convenor	**Vinay Kumar Mishra**, Director, ICAR-Research Complex for NEH region, Umiam, Meghalaya	
Rapporteurs	**Krishnappa R.,** ICAR-NEH, Umaim, Meghalaya **H.D. Talang**, ICAR-NEH, Umaim, Meghalaya	
12:00-12:30	***Plenary Lectures*** Government Initiatives towards Management of Biodiversity in North-Eastern India	**Dr Brahma Deo Ram Tiwari**, IAS, Commissioner and Secretary to Governor, Meghalaya
12:30-13:00	Value Chain Development for Agrobiodiversity Products in North-East India	**Dr Sanjay Kumar**, Chairman, ASRB, New Delhi
13:00-14:00	***Lunch Break***	

TECHNICAL SESSION I

Biodiversity for Food and Agriculture

(Sub-themes: Status, Ethnobotany, Traditional Knowledge, Collection, Evaluation, Characterization)

(*Concurrent Poster Session*)

Session 1A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*			**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*	
Co-Chairs	**P.L. Gautam**, Chancellor, CAU, Pusa, Samastipur **R.K. Tyagi**, Vice President, ISPGR, New Delhi		***Co-Chairs***	**J.K. Jena**, DDG (Fisheries Science), ICAR, New Delhi **Raghavendra Bhatta**, DDG (Animal Science), ICAR, New Delhi*
Convenor	**Harish G.D.**, ICAR-NBPGR, Umiam, Meghalaya		***Convenor***	**G. Kadirvel, Director**, ICAR-ATARI, Guwahati, Assam
Rapporteurs	**Subarna Hajong**, ICAR-NBPGR, Umiam, Meghalaya **L. Touthang**, ICAR-RCNEH, Umiam, Meghalaya		***Rapporteurs***	**A.A.P. Milton**, ICAR-RCNEH, Umiam, Meghalaya **S. Gojendra Singh**, ICAR-RCNEH, Umiam, Meghalaya
14:30-14:25	***Keynote Lectures*** Strategies for management of agrobiodiversity for sustainable seed industry in North-eastern India	**Prabha Shankar Shukla,** Vice Chancellor, NEHU, Shillong, Meghalaya	***Keynote Lectures*** Biodiversity to bio-wealth: animal and fisheries in North-Eastern India	**K.M. Bujarbaruah,** Vice President, NAAS & Former DDG (Animal Science), ICAR, New Delhi
14:25-14:50	Biodiversity and prospect of flower production in North-Eastern India	**K.V. Prasad**, Director, DFR, Pune, Maharashtra	Animal genetic resources in North-Eastern India	**B.P. Mishra,** Director, ICAR-NBAGR, Karnal
14:50-15:05	***Invited Lectures*** On farm conservation of fruit diversity in North East India	**Shailendra Rajan,** Former Director, ICAR-CISH, Lucknow	Biodiversity for climate resilient livestock production in North-Eastern India	**K.K. Baruah,** Principal Scientist & Former Head, ICAR-RCNEH, Umiam, Meghalaya

Session 1A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*			**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*	
15:05-15:20	Diversity of horticultural crops in North-Eastern India	**M. Sankaran**, Head, Division of Fruit Crops, ICAR-IIHR, Bengaluru	***Invited Lectures*** Roadmap for conservation and utilization of pig genetic resources in North-Eastern India	**V.K. Gupta**, Director, ICAR-National Research Center on Pig, Guwahati, Assam
15:20-15:35	Biodiversity of rice in North-eastern India: A source for crop improvement against biotic and abiotic stresses	**Gopala Krishnan S.**, Head, Division of Genetics, ICAR-IARI, New Delhi	Challenges and opportunities in conservation and utilization of yak in sustainable hill farming system	**Mihir Sarkar**, Director, ICAR-National Research Center on Yak, Arunachal Pradesh
15:35-15:50	Biodiversity and utilization of Citrus spp. in North-Eastern India	**B.N. Hazarika**, Dean, CAU, Pasighat, Manipur	Challenges and opportunities in conservation and utilization of mithun in sustainable hill farming system	**S. Girish Patil**, Director, ICAR-National Research Center on Mithun, Nagaland
15:50-16:05	Utilization of genetic resources of maize from North-Eastern Himalaya with special reference to 'Sikkim Primitive' - a unique landrace with extraordinary prolificacy.	**Firoz Hossain**, Principal Scientist, ICAR-IARI, New Delhi		
16:05-16:25	***Tea/Coffee Break***			

16:25-17:30 **Rapid Oral Presentations** (*5 min. each*)

Session 1A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
1. **Morphological diversity in orchids** **L.C. De**, S.S. Biswas, Kalaivanan, N.S., Suman Natta, Chandan Gowda H., Nikhila V.A., Bidyarani Senjam, Ashok Kumar and S.P. Das	1. **Indigenous cattle biodiversity in North East India: A step towards characterization and documentation** **Rahul Katiyar**, Elone Lucy, Doni Jini, Sourabh Deori, Mahak Singh, Blessa Sailo, Lalhruaipuii, Asit Chakrabarty, Sunil Doley and G. Kadirvel
2. **Conservation of maize genetic resources of North Eastern India- Status, prospects and challenges** **Sherry Rachel Jacob**, Aravind J., Padmavati Ganpat Gore, Mallikarjun Biradar, Shashank HG, Anju Mahendru-Singh	2. **Alternative protein sources from north east India's snail diversity: addressing food safety concerns** **Samir Das**, Archana Thakur, K. Srinivas, Aleimo Momin, A.A.P. Milton, Prashant Mahanta, Sabita Debbarma, Sandeep Ghatak and K. Puro
3. **Yield and yield components of potato germplasm in northern plains** **Babita Chaudhary**, S.K. Luthra, V.K. Gupta, Dalamu, Vinod Kumar and Rajesh Kumar	3. **Traditional animal husbandry practices among the Missing tribal population of Dhemaji district, Assam: A case study on livestock and poultry management** **Manish Pandey**, Azhaguraja M, Bornalee Handique, K. Tamilarasan, Da U Ruhi Pde, M.B. Chaudhary, Arunjyoti Baruah, Arpan Bhowmik, Deepjyoti Baruah and Amjad K. Balange
4. **Insights into phenotypic diversity of yard long bean germplasm conserved in National Genebank of India** **Kuldeep Tripathi**, RK Pamarthi, Padmavati G. Gore, Dileep Tripathi, M Latha, P K Singh, JC Rana, and RK Gautam	4. **Balang: An indigenous cattle germplasm in eastern Himalaya of Arunachal Pradesh** **Doni Jini**, R. Khatiyar, G. Kardivel, J. Bam, Rajesh A Alone, T. Angami and L. Wangchu

Session 1A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
5. **Development of non-psychoactive *Cannabis sativa* L. genotypes in half sib seed progeny segregation generation through diversity analysis** **Nashra Aftab**, Ram Kishor, Himanshu Kumar Kushwaha, Akancha Gupta, Priyanka Prasad, Vagmi Singh, Narendra Kumar, Namita Gupta, Ram Swaroop Verma and **Birendra Kumar**	5. **Assessing growth performance, economic viability, and adaptability of Black Bengal goats in mid-hill environments of Meghalaya** **G. Bhuvana Priya**, A.A.P.Milton and Ram Singh
6. **Exploring the nutritional potential and anti-nutritional components of wild edible fruits of the Eastern Himalayas** **Thejangulie Angami**, L. Wangchu and Doni Jini	6. **Phenotypic characterization of goats of West Champaran, Bihar using principal component analysis with orthogonal and non-orthogonal rotations** Ravi Kant Kumar, Birendra Kumar, **Ramesh Kumar Singh**, Soni Kumari and J.P. Gupta
7. **Collection and conservation of wild edible fruits and spices from Upper Assam Valley** **Puran Chandra**, Shivakumar M.S., Soyimchiten Longkumer, Muhammed Nissar V.A., K.P. Mohapatra	7. **Fisheries and aquaculture in Northeast India: Status, issues, and sustainable development opportunities** **Da U Ruhi Pde**, Arunjyoti Baruah, Deepjyoti Baruah, Amjad K. Balange, Bornalee Handique, Manish Pandey, M.B. Chaudhary and Azhaguraja Manoharan
8. **Nutritional potential of *Perilla frutescens* (Linn.) Britt. in the northeastern hill (NEH) region of India** **S.K. Singh**, A.K. Misra, Hannah K. Asangla, T. Esther Longkumer, Venkatesh, Sharanappa C.H. and Girish Patil, S	8. **A review of aquatic fish biodiversity in Northeast India: current status, conservation challenges, and future strategies** **Chandan Debnath**
9. **Morphological evaluation of Khamti lahi rice landraces of Arunachal Pradesh** **Utpal Barua**, Madhumita Sonowal Bora and Bidyapati Ngangom	9. **Ecological study of water quality and fish species in Kyrdemkulai reservoir, Meghalaya** **S. G. Singh**, S.K. Das, N.P. Devi, P. Mahanta, C. Debnath and T. Tayung

Session 1A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
10. **Genetic richness of cucumber (*Cucumis sativus* L.) from northeastern India: characterization for biotic, abiotic and nutraceuticals properties** **Pradeepkumara N**, Shyam Sundar Dey, Tusar Kanti Behera, Anilabha Das Munshi, Subhashree Subhasmita, B.G Supreetha, Mahendra Kumar Verma	10. **Fruit fly (Diptera: Tephritidae) fauna of northeast India: A profile** **K.J. David**, Kennedy Ningthoujam, N.R., Noor Mahammed, S. Salini and S.N. Sushil
11. **Habitat distribution mapping of Hippophae sps in RCP 4.5 climate scenario in the Indian Himalayas** **Saurabh Kumar**, Puran Chandra, D.P. Semwal, Soiyemchiten, K.P. Mohapatra	11. **Stink bugs (Hemiptera: Heteroptera: Pentatomidae) diversity of Meghalaya: What we know and what we need to understand** **S. Salini**, Safeena Majeed, Romila Akoijam, K. J. David and S. N. Sushil
12. **Indian knowledge on traditional rice cultivars: Collection, Conservation and its successful utilization** **Bidhan Roy**, Surje Dinesh Tulsiram, Swarnajit Debbarman, Gadge Sushant Sundarrao, Monish Roy, Priyanka Sharma, Pallabi Saha, Sagnik Poddar, Nipa Biswas, Utpal Maity, Punam Sinha, Jeeban Kumar Nayak	12. **Genetic characterization of *Hermetia Illucens* (Black Soldier fly) and its potential use as an alternative protein source in poultry farming for the North East hill region.** **Tilling Tayo**, Robin Bhuyan, Samir Das, Sourabh Deori, Srinivas Kandhan, Kekungu-U Puro, Durlav Bora, Sandeep Gangasani, Lakhyajyoti Borah, Papori Talukdar, Adib Haque, Shantanu Tamuly, Masuk Raquib, Melody Lalhriatpuii, Abedin S. Nabil, L. Sushitra, Meenaksi Kalita and Tanay Ghosh
13. **Espalier Systems: Evaluating the performance and conservation of tree fruit crops and varieties** **Pradhan S**, Chawda V, Shukla D, Ghosh R. and Rajan S.	13. **Diversity of Syrphid Flies in Mid Altitude Hills of Meghalaya** **Rumki H. Ch. Sangma**, Sandip Patra, K. Koutsu, H. Talang, A.R. Singh and B. Bhattacharjee
17:30-17:45 **Discussion & Co-Chairs Remarks**	

EVENING LECTURE

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Co-Chairs	**T. Mohapatra**, Chairman, PPV&FRA, New Delhi **Sanjay Kumar**, Chairman, ASRB, New Delhi	
Convenor	**Anuradha Agrawal**, General Secretary, ISPGR, New Delhi	
Rapporteur	**Sherry R. Jacob**, ICAR-NBPGR, New Delhi	
18:00-18:10	Introduction of Speaker	**Anuradha Agrawal**, General Secretary, ISPGR, New Delhi
18:10-18:45	Evening Lecture	**R.S. Paroda**, President, ISPGR and Chairman, TAAS, New Delhi
18.45-18.55	Chair/Co-Chairs's Remarks	
18.55-19.00	Vote of Thanks	**Anuradha Agrawal**, General Secretary, ISPGR, New Delhi
19.00-20.00	**Cultural Program**	
20.00 onwards	***Dinner***	

DAY 2: OCTOBER 24, 2024 (THURSDAY)

TECHNICAL SESSION II

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Access, Exchange, Benefit Sharing and IPR Systems – Policy Considerations

(Sub-themes: Access and Benefit Sharing, IPRs, Protection of Plant Varieties and Farmers' Rights Act, Biological Diversity Act, Patent, Geographical Indications, Genetic Stock Registration)

(*Concurrent Poster Session*)

Co-Chair	**T. Mohapatra**, Chairman, PPV&FRA, New Delhi
Convenor	**D.K. Agarwal**, Registrar-General, PPV&FRA, New Delhi
Rapporteur	**Pankaj Baiswar**, ICAR-NEH, Umiam, Meghalaya **M. Bilashini Devi**, ICAR-NEH, Umiam, Meghalaya

09:30-09:35	**Welcome**	***Convenor***
09:35-10:00	***Keynote Address*** Role of PPV&FRA in conservation and use of agrobiodiversity	**D.K. Agarwal**, Registrar-General, PPV&FRA, New Delhi
10:00-10:15	***Invited Lecture*** Status and Prospect of GI crops in North-Eastern India	**V.K. Mishra**, Director, ICAR-RCNEH, Umiam, Meghalaya
10:15-10:30	Commercialization of plant varieties under public research systems	**Praveen Malik**, AgriInnovate, ICAR, New Delhi
10:30-10:45	Diversity of the cattle in north-eastern India: Farmers issues in conservation and their uses	**G. Kadirvel**, Director, ICAR-ATARI, Guwahati, Assam **H.C. Bhattacharya**, Former DE, AAU & Scientific Advisor, ICAR ATARI, Guwahati
10:45-11:00	Flagging the issues of the farmers for adopting agro-biodiversity in local food systems	**K. Noren Singh**, Professor, CPGS-AS, CAU, Umiam, Meghalaya
11:00-11:30	***Tea/Coffee Break***	
11:30-11:45	Flagging the issues with farmers related to medicinal & aromatic crops	**Mohan Lal**, Principal Scientist, CSIR-NEIST, Jorhat, Assam
11:45:12:30	Discussion & Chairs' Remarks	

TECHNICAL SESSION III

Innovations and Modern Tools for *Ex Situ* Conservation and Utilization

(Sub-themes: Biotechnology tools for trait discovery, ex situ conservation, geo-informatics, digital sequence information, information and communication technology

(*Concurrent Poster Session*)

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*			**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*		
Co-Chairs	**Kuldeep Singh**, Head, Genebank, ICRISAT, Hyderabad **Sunil Archak**, Professor (PGR) & OIC, GEPU, ICAR-NBPGR, New Delhi		***Co-Chairs***	**B.P. Mishra**, Director, NBAGR, Karnal, Haryana **P.K. Pandey**, Director, DCWF, Bhimtal, UK	
Convenor	**L.C. De**, Principal Scientist-Horticulture, ICAR-NRCO, Pakyong, Sikkim		***Convenor***	**S.K. Das**, ICAR-RCNEH, Umiam, Meghalaya	
Rapporteurs	**Monika Singh**, ICAR-NBPGR, New Delhi **Praveen G**, ICAR-NEH, Umiam		***Rapporteurs***	**Meena Das**, ICAR-NEH, Umiam **Tasso Tayung**, ICAR-RCNEH, Umiam	
12:35-12:40	**Welcome**	**Convenor**	**12:35-12:40**	**Welcome**	**Convenor**
12:45-13:10	***Keynote Lectures*** Biofortified crops for nutritional security	**H.S Gupta**, Chairman Agriculture Commission, Assam	12:45-12:55	***Keynote lecture*** Genetic resources for cold water fisheries	**P.K. Pandey**, Director, DCWF, Bhimtal, UK
13:10-13:30	Habitat distribution modelling for critically endangered tree species of North-Eastern India	**S.K. Barik**, Professor, NEHU and Former Director, CSIR-NBRI, Lucknow, UP	12:55-13:10	***Invited Lectures*** Biotechnological interventions in animal health research toward conservation of the livestock	**Sandeep Ghatak**, Head, ICAR-RCNEH, Umiam, Meghalaya

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*			Session 1B: Animal and Fish Genetic Resources *(Venue: DNB Hall, ICAR NEH, Umiam)*		
13:30-13:40	***Invited Lectures*** Lesser known horticultural crops for north-eastern India for health and nutrition	**C.P. Suresh**, Professor and Head, Horticulture, NEHU, Tura Campus, Tura.	13:10-13:25	Molecular signature sequences for identification of pig genetic resources of North-Eastern India	**Pranab Jyoti Das**, Principal Scientist, ICAR-NRCP, Assam
			13:25-13:40	Genomics and AqGRISI – Aquatic Genetic Resources System in India	**Vindhya Mohindra**, Head, Genomics and Computational Resources Division, ICAR-NBFGR, Lucknow, UP
13:40-14:30	***Lunch Break***				
14:30-14:45	Conservation and utilization of orchid germplasm	**S.P. Das**, Director, ICAR-NRCO, Gangtok, Sikkim	14:30-14:45	Genetic diversity of sheep and goat in North-Eastern India	**Galib Zaman**, Professor & Head, Division of Animal Genetic & Breeding, CVSc, Khanapara, Guwahati, Assam
14:45-15:00	Status and Conservation of PGR in National Gene Bank	**Anju M. Singh***, Head, Division of Germplasm Conservation, ICAR-NBPGR, New Delhi	14:45-15:00	Impact of climate change on ecology and diversity of wetland and riverine fishes in North-eastern India	**Birendra Kumar Bhattacharya**, Principal Scientist, ICAR-CIFRI Regional Centre, Guwahati, Assam

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*			**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*		
15:00-15:15	Strategies for Marker-Assisted Breeding of Rice Genotypes for Soil-Deficient in Nitrogen and Phosphorus	**Mayank Rai**, Dean, PG College of Agriculture, RPCAU, Samastipur, Bihar	15:00-15:15	Genomics and conservation of indigenous animal breeds	**R.K. Pundir**, Head, Animal Genetic Resources Division, ICAR-NBAGR, Karnal, Haryana
15:15-15:25	Recent advances in tea crop improvement for traits using biotechnological tools	**Sangita Borchetia**, Scientist-F, Tocklai Tea Research Institute, Jorhat, Assam	15:15-15:25	Conservation and use of Biodiversity in poultry of North-eastern India	**Sunil Doley**, Head & Principal Scientist ICAR-RC NEH, Mizoram Centre, Kolasib, Mizoram
15:25-15:40	Use of unmanned aerial vehicle (UAV) in evaluation and conservation of the genetic resources	Jonali Goswami Scientist-F, NESAC, Meghalaya	15:25-15:40	Semen technology for conservation of indigenous livestock	**Saurabh Deori**, Senior Scientist, ICAR NEH, Umiam, Meghalaya
15:40-16:00	***Tea/Coffee Break***				

16:00-17:10 **Rapid Oral Presentations** (*5 min. each*)

Contd.

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
1. **Developing seedless Bhimkol: A strategy to combat hidden hunger through advanced breeding techniques.** **Kalpana S.**, Backiyarani S., Karthic R, Uma S. and Selvarajan R.	1. **Protein profiling of cervico-vaginal mucus during follicular phase of estrous cycle in Lakhimi cow** Chandni Roy, **Lakshya J. Dutta**, Raju Deka, Dhruba J. Borpujari, Lukumoni Buragohain, Arfan Ali, Nekib Ahmed, Momi. Sarma and Durlav P. Bora
2. **Genome wide association study (GWAS) to identify novel genomic region for Fusarium head blight (FHB) resistance in Indian durum wheat (*Triticum durum* L.) germplasm** **Vikas V.K.**, Budhlakoti N., Saharan M.S., Pradhan A.K., Divya S., Mishra D.C., Singh A.K., Sivasamy M., Jayaprakash P., Yashavathakumar K.J., Sudhir N., Suma B., John Peter, Suganya C., Vaishali G., Singh G.P. and Sundeep Kumar	2. ***In-vitro* semen characteristics and fertility of Lumsniang boar during liquid preservation following artificial insemination** **Himsikha Chakravarty**, Rahul Katiyar, GautamKhargharia, S.N. Abedin. Samir Das, Sandeep Ghatak and Sourabh Deori
3. **Diverse entomopathogenic fungi in Manipur soil: Isolation, characterization, and biodiversity assessment** **Aruna Beemrote**, M.R. Srinivasan, Palle Pravallika, Arati Ningombam, Kshetrimayum Somendro Singh	3. **Evaluation of egg quality traits of indigenous geese of Assam : an unexplored biodiversity** Hanidul Hoque, **Arundhati Phookan**, Galib Uz Zaman, Bula Das, Arpana Das and Jakir Hussain
4. **Collection and *ex situ* conservation of the diversity in Garcinia from Upper Assam** **Muhammed Nissar V.A.**, Shivakumar M.S., Puran Chandra, Soyimchiten and Saji K.V.	4. **Decoding selective sweeps associated with tropical adaptability in Guinea fowl through whole-genome sequencing** **Azhaguraja. M**, Simmi Tomar, Jyotika Bhati, Ravi Kumar Gandham, Ashok K. Tiwari, Sirajuddin M and Saravanan K.A.

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
5. **Comparative metagenome analysis of rhizoshperic soil associated with different banana (*Musa* spp.) genome groups** **Robert Thangjam**	5. **Induced breeding of Wallago attu (Bloch & Schneider, 1801) and seed production in Manipur** **Ch. Basudha**, W. Anand Meetei, N. Peetanbari Devi, N. Soranganba, S. Khogen Singh, Arati Ningombam, Kh. Rishikanta Singh and Ramgopal Laha
6. **Near infrared reflectance spectroscopy coupled artificial intelligence-based approaches for predicting protein content in potential crops of NEH region of India: A rapid mining tool for screening large germplasm** **Simardeep Kaur**, Naseeb Singh, Amit Kumar, Philanim W.S., Veerendra Kumar Verma and Rakesh Bhardwaj	6. ***Ex-situ* conservation of endangered fish chocolate mahseer Neolissochilus hexagonolepis (McClelland, 1839) through short-term sperm preservation method** **Tasso Tayung**, Sanjay Kumar Das, Sourabh Deori, Rahul Katiyar, Sadokpam Gojendro Singh, Chandan Debnath, Prasanta Mahanta and Pynhun J. Ryntathiang
7. **Genetic resources and variability of buckwheat for physio-morphological and phosphorus solubilisation in acid soils of Meghalaya** **Krishnappa R.**, Amit K., Prabha M., Jayanta L., Gangarani A., Bhattacharya B. and V.K. Mishra	7. **Ecopath with ecosim-based mass-balance modelling in a small sub-tropical reservoir: strategies for sustainable fisheries management** **Sanjenbam Bidyasagar**, Sadokpam Gojendro Singh, Sushma Keisham, Yumnam Bedajiit Gusheinzed Waikhom and Ch. Basudha Devi
8. **SRAP and TRAP molecular markers based fingerprinting decodes high genetic diversity in rice germplasm of Northeast India** **Konsam Sarika**, Irengbam Meghachandra Singh, Ngangkham Umakanta Singh, Elangbam Lamalakshmi Devi, Harendra Verma, Ayam Gangarani Devi, Amit Kumar, Salam Gunamani Singh, Suvajit Karak, Thokchom Repahini Devi, Chongtham Chinglen Meetei, Ramgopal Laha	8. **Stock structure analysis and reproductive biology of Rita rita (Hamilton, 1822) along the middle stretch of Brahmaputra River system using truss network analysis** **Asifa Najnin**, Imtiaz Ahmed, Rinku Gogoi, Jiten Sarma and Rinchen Bhutia

Session III A: Plant Genetic Resources *(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)*	**Session 1B: Animal and Fish Genetic Resources** *(Venue: DNB Hall, ICAR NEH, Umiam)*
9. **Genetic diversity and trait-marker associations in rice bean (*Vigna umbellata*) for yield and yield related traits** **Philanim W.S.**, Amit Kumar and Letngam Touthang	9. **Vision-based artificial intelligence solutions for effective monitoring of smart pig farms** **Salam Jayachitra Devi**, Jaya, Seema Rani Pegu, Priyajoy Kar, Satish Kumar, N.H. Mohan and V.K. Gupta
10. **Characterization of banana cultivars from North Eastern India for higher and individual functional bioactives of nutraceutical and immunomodulatory uses** **M. Mayil Vaganan**, V.K. Mailraja and I. Ravi	10. **Conservation and use of artificial insemination technology in pig; A SEM based model to predict farmers' intension** **Pampi Paul**, N. Uttam Singh, Sourabh Deori, A. Yumnam, A. Roy, Kamni P. Biam, M.B. Tengli and B.P. Singh
11. **Unravelling the selection criteria for Capsicum chinense with high capsaicin content** **Twahira Begum**, Joyashree Baruah and Mohan Lal	11. **The critical need for developing a vaccine against a global threat: African Swine Fever Virus** **Juwar Doley**, Swaraj Rajkhowa, Seema Rani Pegu, Rajib Deb, Souvik Paul, Vishal Rai, N.H. Mohan, Pranab Jyoti Das, Samir Das and V.K. Gupta
12. **Georeferencing biochemical diversity for prioritising conservation sites in fruit trees: A case study in Jackfruit (*Artocarpus heterophyllus* Lam.)** **Shashi Bhushan Choudhary**	12. **Comparative expression profiling of *miRNAs* in African Swine Fever Virus (ASFV) infected and non-infected porcine tissue samples** **Likhitha Nunavath**, Sri Shalini M., Satish Kumar, Seema Rani Pegu, Meera K., Nabajyoti Deka, G.S. Sengar, Rajib Deb, Pushpendra Kumar, V.K. Gupta and Pranab Jyoti Das
13. **Microsatellite marker assisted molecular diversity and population structure analysis of *Kaempferia galanga* Linn. germplasm collected from different parts of India** **Ankita Gogoi**, Twahira Begum and Mohan Lal	13. **Characterization of the complete mitogenome of Manipuri Black pig and tracing its domestication status** **Sri Shalini M.**, Likhitha Nunavath, Satish Kumar, Meera K., Nabajyoti Deka, Seema R. Pegu, Pushpendra Kumar, V.K. Gupta and Pranab Jyoti Das
17:10-17:30 Discussion & Co-Chairs Remarks	
19:30-20:30 ***Dinner***	

DAY 3: OCTOBER 25, 2024 (FRIDAY)

TECHNICAL SESSION IV

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Integrating Biodiversity for Sustainable Farming

(Sub-themes: Role of communities, farmers, Krishi Vigyan Kendras, Non-Governmental Organizations, Farmer Producer Organizations)

(Concurrent Poster Session)

Co-Chairs	**J.C. Rana**, Country Director, Alliance for Bioversity International & CIAT, Asia-India Office, New Delhi **Lakshmi Kant**, Director, ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora
Convenor	**S.P. Das**, Director, ICAR-NRC-Orchid, Sikkim
Rapporteur	**Rakesh Kumar Chahota**, CSK Himachal Pradesh Agricultural University, Palampur, HP **Padma Gore**, ICAR-NBPGR, New Delhi

09:00-09:05	**Welcome**	**Convenor**
9:05-9:25	***Keynote Lecture*** Mainstreaming Agrobiodiversity for enhancing climate resilience, nutrition, livelihoods and ecosystems services	**J.C. Rana**, Country Director, Alliance for Bioversity International & CIAT, Asia-India Office, New Delhi
09:25-09:40	***Invited lectures*** Role of KVK in conservation and utilization of genetic diversity in North-eastern India	**Arunava Pattanayak**, Former Director, ICAR-IIAB, Ranchi & ICAR-VPKS, Almora, UK
09:40-09:50	Community-based value addition and entrepreneurship	**Ajit Singh**, ABANI Farms, Borkhotsari, Ri Bhoi, Meghalaya
09:50-10:00	Role of Northeast Network (NEN) in conservation of Biodiversity	**Laimanda A. Ryngksai**, State Coordinator, Northeast Network (NEN)-Meghalaya Springside Nongthymmai, Shillong
11:45:12:30	Discussion & Chairs' Remarks	

10:00-10:55 **Rapid Oral Presentations** (*5 min. each*)

1. **Community based seed banks: A strategy for biodiversity conservation and sustainable agriculture in rural villages**

   Hannah K. Asangla, T. Esther Longkumer, Venkatesh, Sharanappa C.H., Khrüzho Sakhamo and S.K. Singh

2. ***In-situ* conservation of indigenous fruits of Bundelkhand region by collaborative efforts of local communities, Agricultural institutes, KVKs, NGOs, FPOs, and farmers**

   Vishvajeet Singh, Paramanad Prajapati, Aadarsh Pandey, Sachin Kumar Singh, Siddharth Kumar and A.K. Srivastava

3. **Varietal evaluation of maize and buckwheat under organic management of maize-buckwheat cropping system**

   Shaon Kumar Das, Sudip Kumar Dutta, V.K. Mishra and Amit Kumar

4. **Farmer participatory evaluation for conservation and promotion of Comilla Cotton (*Gossypium arboreum* L.) in the Garo hills of Meghalaya**

   H.G. Kencharaddi, G.I. Ramkrushna, S.T. Pavan Kumar, Siknora R. Marak, Jyoti Vastrad and Y.G. Prasad

5. **Integrated pest management in cotton for conservation of natural enemies**

   Ajanta Birah, Licon K. Acharya, Anoop Kumar, M.K. Khokhar and Subhash Chander

6. **Integrated farming system for sustainability and livelihood security- a success story of Mr L. Kanlum**

   Khumlo Levish Chongloi, A. Ameeta Devi, Y. Prabhabati Devi

7. **Using biodiversity to protect its gifts: A case of chak-hao and its protection from storage pests using indigenous plants in Manipur**

   Arati Ningombam, Aruna Bemrote, Ch. Basudha, Ch. Sonia, Y. Prabhabati Devia, N. Ajitkumar Singhb, Ch. Premabati, L. Langlentombi Chanu, A.R. Singh and Kh. Rishikanta Singh

8. **Ecological structure and functional dynamics of home gardens in the foothills of Nagaland**

   Pempa L Bhutia, N. Raju Singh, Azeze Seyie, Mahak Singh, H. Kalita and V.K. Mishra

9. **Unleashing agricultural transformation through Rabi maize farming in Assam**

   S.L. Jat, Manish Kakraliya, Ramniwas, Poonam Yadav, V.K. Arya, Romen Sharma, Bhupender Kumar and H.S. Jat

10. **Effect of pollen storage on kiwifruit (*Actinidia deliciosa*) quality and production under organic management systems**

    Sudip Kumar Dutta and Shaon Kumar Das

11. **Conserving fruit crop diversity: VNR Research Centre's efforts in promoting use of genetic resources**

    Ghosh R., Chawda V., Shukla D., Pradhan S. and Rajan S.

10:55-11:05	Discussion & Co-Chairs Remarks
11.05-11.30	***Tea/Coffee Break***

TECHNICAL SESSION V

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Entrepreneurship and Value Addition of Genetic Resources - Role of Youth and Women

(*Concurrent Poster Session*)

Co-Chairs	**G Kadirvel**, Director, ICAR- ATARI, Guwahati, Assam **B.K. Sohaliya**, Chairman, Farmers (Empowerment) Commission, Government of Meghalaya
Convenor	**S. Basanta Singh**, Principal Scientist, ICAR-NEH, Umiam, Meghalaya
Rapporteurs	**Vikas V.K.**, ICAR-IARI, Regional Station, Wellington, Tamil Nadu **Aniruddha Roy**, ICAR-NEH, Umiam, Meghalaya

11:30-11:35	**Welcome**	**Convenor**
11:35-11:55	***Keynote Lecture*** Entrepreneurial ecosystem creation with wild edible fruits using fermentation technology	**B.K. Sohaliya**, Chairman, Farmers (Empowerment) Commission, Government of Meghalaya, Shillong, Meghalaya
11:55-12:10	***Invited Lectures*** Role of rural youth in conservation and use of North-Eastern region biodiversity	**Bhogtoram Mawroh,** Coordinator, North East Society for Agroecology Support (NESFAS), Shillong, Meghalaya
12:10-12:25	Building value chain for native crops of Assam	**Rajib Sarma**, Foundation for Development Integration, Guwahati
12:25-12:40	Community based agri-entrepreneurship in North-Eastern India	**S.S. Roy**, Principal Scientist, ICAR-CCRI, Nagpur, Maharashtra

12:40-13:40 **Rapid Oral Presentations** (*5 min. each*)

1. **Unravelling the nutraceutical potential of five medicinal Dendrobium orchid flowers based on their colour variation - a systemic approach for utilization of natural resources in North Eastern Himalayan**

   Suman Natta, Nasiruddin Shaikh, Ekatpure Sachin, Suprava Basnett, Tshering Chomu Bhutia, Chandan Gowda H, Nikhila V.A., S.S. Biswa, L.C. De, Kaushik Banerjee, Kalaivanan N.S. and S.P. Das

2. **Opportunities and prospects for agro based entrepreneurship development in north east India**

   Kh. Rishikanta Singh, Umakanta N., T. Basanta Singh, Arati Ningombam, Konsam Sarika, H. Naresh Singh, Kenjit Tongbram, Ch. Basudha and Ramgopal Laha

3. **Antioxidant component and antioxidant activity of selected underutilised fruit crops grown in north eastern India**

   Tanmay Kr. Koley, Anup Das, Ujjwal Kumar, Kirti Saurav, Rohan K. Raman, Mahesh K. Dhakar and Ravi Ranjan

4. **Utilization of ripe Karonda (*Carissas carandas* L.) fruits for development of nutritional drink**

   Ajay Yadav, Priya Awasthi, Balaji Vikram, Subhash Chandra Singh, Rohit Kumar and Shubham Gangwar

5. **Entrepreneurship development through value addition of underutilised Pomelo**

   Y. Prabhabati Devi, Arati Ningombam and A. Ameeta Devi

6. **A study on agricultural marketing strategies and challenges faced by farmers of Longleng district of Nagaland**

   Pallabi Phukan, H.C. Kalita, H. Kalita

7. **Entrepreneurial opportunities and challenges for women in agriculture: A study in Jorhat district of Assam**

   Maitrayee Dutta and Pallabi Bora

8. **Livelihood opportunities in ethnic food system of Himachal Pradesh**

   Anup Katoch, Ranjna Verma, Dinesh Kumar Yadav, R.K. Chahota and J.C. Rana

9. **Success stories on scientific beekeeping for entrepreneurship development in Meghalaya**

   Sandip Patra, R.H. Ch. Sangma, K. Kuotsu, P. Baiswar, B.K. Singh and S. Hazarika

10 **Preparation, Quality Evaluation and in vitro studies of Cabbage and Cauliflower Waste Silage**

   Bornalee Handique, S.K. Saha, L.C. Choudhary and Ajmal Roshan P.

11 **Incubation Ecosystem in North-East: Strategy to Establish Agripreneurship and Start-Ups through Indigenous Fruits and Vegetables**

   A. Roy, T.B. Marak, H.N. Singh, N.U. Singh, A. Yumnam, P. Paul and B.P. Singh

13:40-14:00 Discussion & Co-Chairs Remarks

14:00:14.30 ***Lunch Break***

TECHNICAL SESSION VI

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Capacity Building and Public Awareness

(*Concurrent Poster Session*)

Co-Chairs	**R.C. Agrawal**, DDG (Agric. Education), ICAR, New Delhi **O.P. Chaurasia**, Director, DRDO-DIHAR, Leh, Ladakh
Convenor	**Manjusha Verma**, Joint Secretary, ISPGR, New Delhi
Rapporteurs	**Kuldeep Tripathi**, ICAR-NBPGR, New Delhi **Simardeep Kaur**, ICAR-NEH, Umiam, Meghalaya

14:30-14:40	**Welcome**	**Convenor**
14:40-15.00	***Keynote Lecture*** Role of educational curricula and public awareness in Conservation and sustainable use of biodiversity	**R.C. Agrawal**, DDG (Agric. Education), ICAR, New Delhi
15:00-15:15	***Invited Lectures*** Empowering indigenous communities through Agroecology Learning Circles (ALCs) for resilient, integrated and innovative natural resource management	**Phrang Roy**, Director, NESFAS, Shillong, Meghalaya
15:15-15:30	Capacity building among youth & women in biodiversity and agro-tourism	**H.H. Mormen**, President, Society for Urban and Rural Empowerment (SURE), Jaintia Hills, Meghalaya
15:30-15:45	Impact of frontline demonstration in uses of improved cultivars of genetic resources in North-eastern India	**Makidul Islam**, Principal Scientist, ICAR-KVK-Ri-Bhoi, Meghalaya

15:45-16:00 **Rapid Oral Presentations** (*5 min. each*)

1. **Yield improvement and Impact analysis of black gram through frontline demonstrations in Ukhrul district Manipur**

   Shashidhar K.S., Samuel Jeberson Premaradhya, N. Bhuvaneswari, S. and Mishra, A.K.

2. **An Introduction and adaptation of improved processing potato variety *Kufri Frysona* to Ri Bhoi district of Meghalaya**

   Yvonne Angel Lyngdoh, Janani P., Ngursangzuala Sailo, Clarissa Challam, Meghna Sarma and Utpal Barua

3.	**Deep learning-enabled mobile application for on-site nitrogen prediction in strawberry cultivation** **Naseeb Singh**, Simardeep Kaur and Kethavath Ajaykumar
16:00-16:10	Discussion & Co-Chair's Remarks
16:10-16:30	***Tea Break***

CONCLUDING SESSION

(Venue: Dr M.S. Swaminathan Conference Hall, ICAR NEH, Umiam)

Capacity Building and Public Awareness

(*Concurrent Poster Session*)

Co-Chairs	**R.S. Paroda**, President, ISPGR, New Delhi **P.L. Gautam**, Chancellor, CAU, Pusa, Samastipur	
Convenor	**R.K. Tyagi**, Vice-President, ISPGR, New Delhi	
Rapporteurs	**Heiplanmi Rymbai**, ICAR-NEH, Umiam, Meghalaya **Philanim W. Shimray**, ICAR-RCNEH, Umiam, Meghalaya	
16:30-16:45	**Summary of Major Recommendations**	**R.K. Tyagi**, Vice-President, ISPGR, New Delhi
16:45-17:15	**Felicitations and Conference Award Distribution**	
17:15-17:35	**Remarks by Co-Chairs**	
17:35-17:45	**Vote of Thanks**	**Veerendra Kumar Verma**, Organising Secretary, NCMAN, Umiam, Meghalaya

Annexure II

Photo Gallery

INAUGURAL SESSION


National Conference


Managing Agro-Biodiv


Managing Agro-Biodiversity in North Ea
(From Biodiversity to Bio-Wealth)
(NCMAN-2024)
October 23-25, 2024
Dr. R.S. Paroda
Shri C.H. Vijayashankar


National Conference
Managing Agro-Biodiversity in North Eastern India


National Conference
Managing Agro-Biodiversity in North Eastern India


Managing Agro-Biodiversity in North Eastern India


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National Conference
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INAUGURAL OF EXHIBITION ON AGROBIODIVERSITY


Breeding Lines


ICA

TECHNICAL SESSIONS


Welcome
Managing Agro-Biodiversity in North Eastern India
Dr. R. S. Paroda


National Conference
Managing Agro-Biodiversity in North Eastern India


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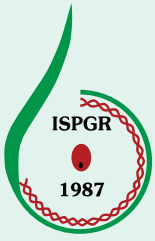

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