2025 Kunming Manifesto: Agrobiodiversity for People and Planet

Alliance of Bioversity International and CIAT
Chinese Academy of Agricultural Sciences (CAAS)
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Introduction

Agrobiodiversity underpins our agri-food systems. Conserving, sustainably using, and investing in our planet's natural wealth of agricultural biodiversity is essential to achieve food security, climate resilience, and environmental sustainability. The currently used food systems, predominantly driven by industrial agriculture, have hindered the achievements in these important areas.

While 2025's State of Food and Nutrition in the World (SOFI) reports point to a global decrease in hunger in 2024, a staggering 673 million people faced hunger during the same year. The report showed that in Africa and West Asia, hunger worsened. Moreover, 2.3 billion people experienced moderate to severe food insecurity in 2024, 683 million more than in 2015, the year global leaders adopted the Sustainable Development Agenda.

The agenda includes achieving zero hunger by 2030. Without a radical and transformative shift in the way we produce, distribute, and consume food, five years from now hundreds of millions of people will still be hungry.

The Kunming Manifesto is a key output of the 3rd International Agrobiodiversity Congress, held in May 2025 in Kunming, China. The congress, attended by over 800 experts, practitioners, decision-makers, and other actors in the food systems from 60 countries around the world to consolidate evidence, demonstrated that increased sustainable use of agrobiodiversity is one of our most effective strategies to eradicate hunger, adapt to climate change, reduce soil degradation, and loss of biodiversity in production landscapes.

The scientific findings, case studies, and best practices shared in Kunming showed that agrobiodiversity has the potential to significantly contribute to goals set forth by the three Rio Conventions on climate, biodiversity, and desertification. Unfortunately, agrobiodiversity is still largely on the sidelines of these existential global discussions.

The Manifesto compiles insights from the Kunming congress to bring the case for agrobiodiversity to an international audience, aiming to catalyze global action based on evidence and expertise.

By "experts," we are not solely referring to global leaders in academia, development, and policymaking. Experts include Indigenous peoples and local rural communities, whose in-depth understanding and generational custodianship of agrobiodiversity merit greater inclusion – and leadership roles – in embedding agrobiodiversity into the food system mainstream.

Their expertise, often overlooked in global discussions on the world's future, can meaningfully contribute to creating the policies, markets, and financial incentives needed for agrobiodiversity to flourish. The agrobiodiversity conservation, use, and success stories are largely the domain of women, who are often the most marginalized in marginalized groups.

In tandem with greater inclusion, unlocking agrobiodiversity's potential to help solve the world's greatest challenges requires transformative intervention by governments around the world. This includes repurposing agricultural subsidies, enacting policies to support seed production and distribution systems, and embedding agrobiodiversity in the global fora that work to mitigate climate change, reverse biodiversity loss, control desertification, and eliminate hunger.

As the Kunming Congress's six key topics in this manifesto demonstrate, agrobiodiversity's benefits are tangible and will repay greater investment many times over. The conclusions call for urgent actions based on the evidence that the conservation and use of agrobiodiversity is inextricably linked to the health of people and the planet we live on.

How Agrobiodiversity Benefits People and Planet

Agrobiodiversity and Climate Resilience
Diverse cropping systems enhance adaptation to changing climates and mitigate emissions.

Agrobiodiversity and Ecosystem Health
Diversity in soil health, water conservation, and pollinators contribute to agricultural productivity, resilience, and sustainability.

Agrobiodiversity and Nutrition
Species diversity, dietary diversity, and human health are all connected. Diverse diets deliver complex micronutrients essential for human health, and increased sustainable use of agrobiodiversity improves food and nutrition security.

Agrobiodiversity and Economic Livelihoods
Biodiverse farming systems enhance rural economies, support smallholder resilience, and create sustainable value chains.

Agrobiodiversity and Social Equity
Women, youth, Indigenous communities, and smallholder farmers all play important roles in safeguarding and enabling access to genetic resources, collecting and sharing knowledge, and leading sustainable agricultural practices.

Key Findings of Technical Sessions

During the 3rd International Agrobiodiversity Congress, experts highlighted how agrobiodiversity serves as a powerful lever for transforming food systems to benefit people and the planet. Discussions emphasized that diverse cropping systems not only strengthen climate resilience and reduce emissions, but also promote ecosystem health by enhancing soil fertility, conserving water, and supporting pollinators. Experts also stressed how agrobiodiversity is essential for improving nutrition, as it enables diverse diets rich in micronutrients critical for human health. Economically, agrobiodiversity underpins rural livelihoods by strengthening smallholder resilience and fostering sustainable value chains. Crucially, agrobiodiversity is rooted in social equity – uplifting the knowledge, agency, and rights of women, youth, Indigenous Peoples, and small-scale farmers who are vital stewards of our planet's agrobiodiversity. Experts and stakeholders concurrently discussed six topics in keynote presentations, innovative research presentations, and plenary discussions. In each one of them, experts outlined how those topics, in synergy with agrobiodiversity, can boost solutions for the most pressing global challenges, with recommendations, priority actions, and next steps.

CIAT / MusaRama

TOPIC 1
Agrobiodiversity for Economic Growth

Economic development can benefit from and contribute to agrobiodiversity through financial instruments, intellectual property protection, and global initiatives that unlock the economic potential of agrobiodiversity. Inclusive partnerships and the integration of young scholars and interdisciplinary collaboration are crucial. Furthermore, it is necessary to ensure that the economic benefits generated from agrobiodiversity are shared fairly and equitably among all stakeholders, particularly local and Indigenous communities. Importantly, ecosystem benefits such as improved resilience, soil health, and biodiversity conservation can be achieved alongside economic gains, creating win-win pathways for sustainable economic development.

Actionable recommendations

1. Promoting dialogue and collaboration between intellectual property experts, economists, financial experts, policymakers, and communities to jointly design systems that maximize and equitably share agrobiodiversity benefits;
2. enhancing modelling and spatial analytics in agrobiodiversity-related policy development to better anticipate and respond to future challenges;
3. supporting capacity-building programs to ensure sustained knowledge generation in agrobiodiversity and economic development;
4. identifying non-market tools to support a transition towards more agrobiodiversity-rich production systems, by repurposing incentives and promoting payment schemes for agrobiodiversity and ecosystem services conservation; and
5. developing clear, enforceable intellectual property protection frameworks to safeguard agrobiodiversity and ensure fair benefit-sharing, particularly for Indigenous and community guardians of agrobiodiversity.

CIAT / Georgina Smith

TOPIC 2

Agrobiodiversity for Climate Change Adaptation and Mitigation

Agrobiodiversity is a cornerstone of climate resilience. Diverse cropping systems can buffer against extreme weather events, provide support for pollinators and natural pest predators, reduce vulnerability to pests and diseases by disrupting pest cycles, and maintain productivity under shifting climatic conditions. Genetic diversity within crops allows for the selection and breeding of varieties tolerant to drought, heat, flooding, and salinity – traits increasingly vital in the face of climate change. Beyond adaptation, agrobiodiversity also contributes to mitigation. Diversified systems enhance soil organic matter, improve carbon sequestration, and reduce reliance on synthetic inputs, thereby lowering greenhouse gas emissions and promoting the restoration of degraded soils.

Actionable recommendations

1. Scaling agrobiodiversity and integrating neglected and underutilized crops into food systems; and
2. scaling must be done thoughtfully, centering farmers' needs, addressing social equity, and avoiding ecological pitfalls.

CIAT / Georgina Smith

TOPIC 3
Agrobiodiversity for Improved Environmental Health and Biodiversity

Current food systems carry significant hidden costs – ranging from public health impacts to biodiversity loss and environmental degradation – that are routinely excluded from market prices. By contrast, diversified, nature-positive systems not only mitigate these costs but also provide *long-term net gains* – up to 200% greater net benefits, yield increases of up to 300% in certain crops (e.g., cocoa), and improvements in ecosystem services such as soil health, pollination, and pest control.

Integrated approaches – combining intercropping, cover crops, and alternative pollinators – consistently outperform monocultures in productivity and resilience in the context of smallholders. Farmers are natural innovators in intercropping and ecological intensification and require support from – not replacement by – technology and policy. Technological innovations, including AI-driven crop monitoring, integrated pest prediction, and blockchain-enabled agroforestry incentives, are helping bridge science and practice, while community-led initiatives such as the Miti Alliance and CGIAR's Multifunctional Landscape Science Program demonstrate the transformative potential of grassroots education, seed banks, and aggregated farming models.

Behavioral and structural barriers, including lack of short-term safety nets, certification hurdles, and market access, remain obstacles to adoption. However, if farmers identify themselves as land custodians and are embedded in trust-based networks (such as seed sharing), they are more likely to adopt sustainable methods.

Actionable recommendations

1. *Recognizing the true cost of current food systems:*
   - expose hidden health, biodiversity, and environmental costs in conventional agriculture;
   - integrate these costs into economic decision-making and market pricing; and
   - ensure policies are in place to support business models that internalize the externalities.
2. *Adopting diversified, nature-positive farming at scale:*
   - promote intercropping, cover crops, and alternative pollinators for yield boosts and long-term net benefits; and
   - support farmers as innovators through targeted training, not top-down replacement.

3. *Empowering community-led models:*
    - invest in grassroots initiatives like seed banks, school gardens, and aggregated farming cooperatives; and
    - encourage environmental stewardship through education and local leadership.
4. *Reforming policies and incentives:*
    - redirect subsidies toward ecosystem services and biodiversity-enhancing practices; and
    - develop mobile and accessible certification platforms.
5. *Integrating science, policy, and local knowledge:*
    - foster alignment between research institutions, policymakers, and farming communities; and
    - use demonstration farms and real-world case studies to build trust and encourage uptake.
6. *Shifting culture and consumer behavior:*
    - elevate traditional agricultural knowledge alongside modern science; and
    - use storytelling, food labeling, and public campaigns to make (agro)biodiversity part of daily life.

CIAT / Stephanie Malyon

TOPIC 4
Agrobiodiversity for Healthy Diets

There is a scientific consensus on the four pillars of a healthy diet, as outlined by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO): nutrient **adequacy, balanced** macronutrient intake, **diversity** across and within food groups, and **moderation** in sugar, salt, and fat (with no trans fats and reduced saturated fats). Healthy diets must be tailored to local contexts, drawing on seasonally available and culturally acceptable foods, with agrobiodiversity prioritized to ensure sustainability and variability/diversity.

However, current agricultural policies often fail to align with dietary needs, as illustrated by Ethiopia's overproduction of staples, oils, and sugar relative to fruits, vegetables, and pulses. Agrobiodiversity should be seen as a strategy to diversify production, strengthen livelihoods, and improve year-round healthy dietary options.

Community engagement – through seed banks, food fairs, media campaigns, and cooking demonstrations – is essential for raising awareness and demand. Mainstream and social media are critical for promotion of agrobiodiverse foods. Advances such as the Periodic Table of Foods Initiative are expanding the understanding of food composition and raising awareness of what is in our food, while promoting edible biodiversity is a viable approach to reduce ultra-processed food consumption and improve health of people.

Actionable recommendations

1. *Aligning agricultural policies with dietary needs:*
   - by integrating nutrition goals into crop production plans, ensuring more fruits, vegetables, and pulses available alongside staples;
2. *promoting edible biodiversity year-round:*
   - through diversified production systems that consider seasonal availability and cultural preferences;
3. *engaging communities:*
   - via seed banks, food fairs, cooking demonstrations, and media campaigns to boost awareness, desirability, and consumption of biodiverse foods;
4. *leveraging scientific tools:*
   - to expand knowledge on food composition and highlight the nutritional benefits of diverse local foods; and
5. *curbing ultra-processed food consumption:*
   - by making biodiverse, healthy options more available, convenient, affordable, and appealing.

CIAT / Georgina Smith

TOPIC 5
Agrobiodiversity for Gender and Social Inclusion

The roles of women, Indigenous Peoples (IPs), and local farmers in managing agrobiodiversity and sustaining traditional food systems are crucial yet frequently overlooked. Their knowledge and contributions, especially unpaid environmental care work, in both community life and formal agricultural research and policy systems are often made invisible.

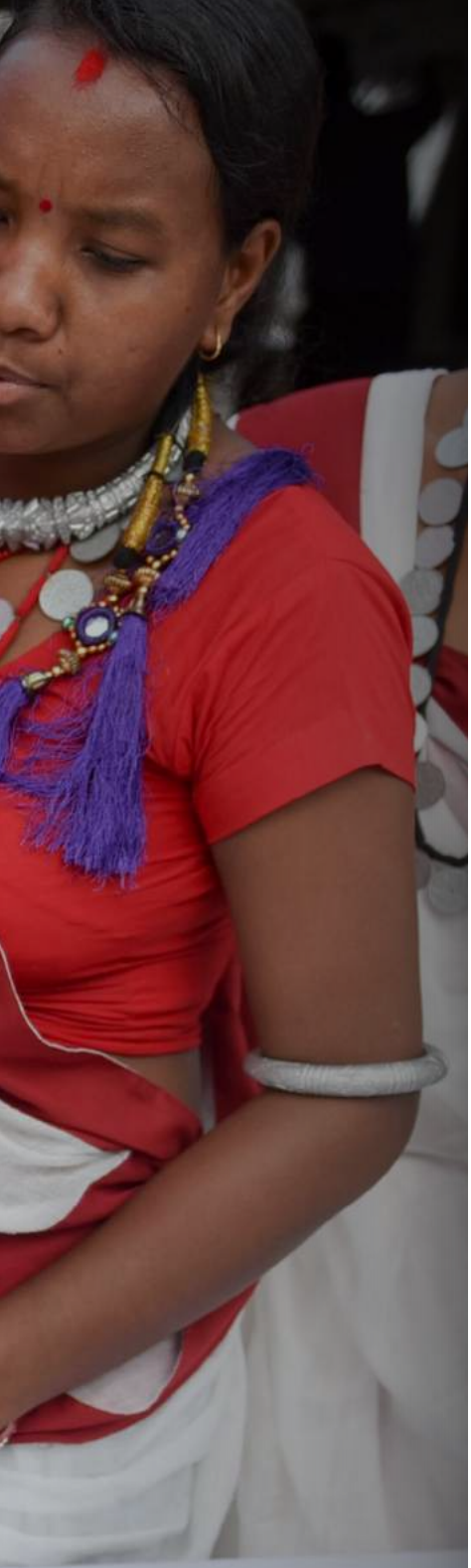
Agrobiodiversity is a *biocultural heritage*, deeply embedded in socio-economic, cultural, and ecological contexts. In the same way, gender and intergenerational dynamics intersect with other social relations and cultures which should be duly acknowledged.

Partnerships are critical as processes of intercultural co-creation, built on trust and guided by farmers' needs and aspirations. Examples such as community seed banks (CSBs) illustrated how local innovations can strengthen agency, facilitate knowledge transmission, and serve as hubs for rural development.

Actionable recommendations

1. *Institutionalizing gender and inclusion:*
   - integrate gender equality into agricultural research institutions, policies, and programs, with continuous self-reflection to challenge biases.
2. *More inclusive policymaking that involves many actors (women, Indigenous Peoples, and local communities) throughout the process, at different levels, on equal terms.*
3. *Leveraging education for intergenerational knowledge:*
   - use formal education and community spaces to transmit agrobiodiversity knowledge between generations, elevating the wisdom of ancestors.
4. *Recognizing and valuing invisible contributions:*
   - ensure that unpaid environmental care work and agrobiodiversity stewardship by women, Indigenous Peoples, and local farmers are formally acknowledged in data, policy, and research systems.

CIAT / Neil Palmer



TOPIC 6

Agrobiodiversity Conservation and Management Strategies

The conservation and sustainable management of plant genetic resources for food and agriculture (PGRFA) are fundamental to building resilient and equitable food systems. In response to growing threats from biodiversity loss, climate change, and the erosion of traditional farming knowledge, experts at the 3rd International Agrobiodiversity Congress called for a more integrated, trust-based, and inclusive global conservation system.

Looking ahead, it will be instrumental to better link *ex situ* and *in situ*/on-farm conservation within a coherent framework that draws on both cutting-edge technologies and traditional knowledge. Community seed banks (CSBs), established and operated by farmers, are already demonstrating their value as key actors in agrobiodiversity conservation at both national and global levels. Recognizing their contributions within national seed systems and biodiversity strategies will further strengthen conservation efforts.

Stakeholders, including governments, policymakers, and development agencies, can play a key role and strongly support approaches that combine conservation with sustainable use – such as community-based agrobiodiversity farming, organic agriculture, and nature-positive restoration. Because CSBs serve as vital platforms for action learning and seed system strengthening, the implementation of incentives and rights-based policies can effectively reward the contributions of custodian farmers. Additionally, firm backing for local and national genebanks, improved documentation and conservation of wild PGRFA and landraces, and greater investment in participatory plant breeding are essential to bolstering agrobiodiversity. Equally important are robust national policies that enable farmers to commercialize seeds of their own varieties, ensuring both resilience and equity in food systems.

Actionable recommendations

1. *Integrating conservation strategies:*
   - build an integrated global framework linking *ex situ* and *in situ*/on-farm conservation, combining advanced technologies with traditional knowledge.
2. *Rewarding custodian farmers:*
   - recognize the rights, skills, and economic contributions of custodian farmers through incentives, legal protections, and participation in decision-making.
3. *Empowering community seed banks:*
   - support CSBs as dynamic hubs for agrobiodiversity learning, restoration practices, and resilient seed systems.

4. *Enabling local governance and decentralized seed sovereignty:*
   - empower local communities to manage and protect their own CSBs and seed systems.
5. *Boosting participatory breeding and local seed commercialization:*
   - expand participatory plant breeding programs and enabling policies for farmers to market their own varieties.
6. *Mapping, documenting, and protecting diversity hotspots:*
   - intensify the documentation and conservation of wild PGRFA and landraces, prioritizing national genebank support and climate-resilient genotype–phenotype–environment studies.

Pathways for Action – The Agrobiodiversity Nexus

Multifunctional Landscape Management
Encouraging landscape approaches that attain multiple objectives, including conservation, carbon sequestration, soil health, and production to deliver benefits across food (nutrition), climate (resilience), and biodiversity (conservation) goals in a balanced manner.

Circular and Regenerative Agriculture
Leveraging agrobiodiversity to enhance soil fertility, optimize nutrient cycles, and reduce external inputs. Improving waste management will also allow for alternative sources of energy, such as brickettes or biogas, hence reducing the collection of wood fuel from forests.

Participatory Science and Traditional Knowledge
Integrating local knowledge with cutting-edge research to promote effective conservation and sustainable use of genetic resources. Indigenous Peoples, farming communities, and women have deep knowledge on how to make food systems more resilient. Bringing together those two knowledge systems will foster improved adoption and sustainability.

Policy and Market Incentives
Identifying regulatory frameworks and financial mechanisms that incentivize agrobiodiversity-enhancing practices. For more agrobiodiversity to be mainstreamed, it is essential that it receives adequate investment and enabling conditions.

Next Steps

As highlighted in the previous sections, a systems-based approach is essential to fully unlock the potential benefits of agrobiodiversity.

Since 2016, successive editions of the International Agrobiodiversity Congress have fostered dialogue among researchers, policymakers, and practitioners. Additional forums of this kind are of paramount importance to strengthen cross-sectoral collaboration and the mechanisms engaging policy, market, and financial incentives needed to create a more facilitative environment for agrobiodiversity.

All stakeholders need to work together to achieve the goals highlighted in this Manifesto, through different types of platforms: scientists and policy makers to engage in the science-policy fora; farmers and scientists to work together on co-creating and co-designing solutions; the private sector, farmers, and policy makers to commit to co-developing robust markets for biodiversity products and enabling mechanisms. More specifically, a sound set of actionable recommendations for each of the key stakeholder groups emerged from the congress are as follows:

For Farmers and Practitioners
Adopting and scaling up **proven** biodiversity-based farming models and knowledge-sharing networks through NGOs and civil societies. In addition, enhancing their agency to enable farmers and practitioners to play a more active role in driving policies and conditions that better support agrobiodiversity.

- Continue promoting their knowledge and crops, through engagement in international fora such as the Rio Conventions;
- for NGOs and civil societies, continue awareness and education campaigns around agrobiodiversity, particularly when associated with improved nutrition and livelihood;
- continue engaging with farmers as citizen scientists to test and validate crops and management practices co-developed and co-created with them, e.g. through participatory variety selections, farmer field schools, and biodiversity inventories in community seed banks; and

- promote the creation of the network of farmers' organizations and community seed banks to enhance their respective agencies and organizations and influence in decision-making processes.

For Policymakers

Mainstreaming agrobiodiversity into national and international food, climate, and biodiversity strategies and promoting an environment that encourages agrobiodiverse production and consumption.

- Full implementation of decisions taken under the three Rio Conventions at the national and regional level as stated in Nationally Determined Contributions (NDCs), National Biodiversity Strategy and Action Plan (NBSAPs), etc.;
- align with agricultural development plans by including (agro)biodiversity goals in such plans;
- promote interministerial collaboration on agriculture, livestock, water, health, environment, etc. to ensure better coherence within government policies;
- redirect harmful subsidies to ensure transition to biodiversity-friendly production, including payment for ecosystem services and biodiversity conservation;
- support, through policies and regulations, a transition to internalize the externalities of business as usual;
- promote public procurement to strengthen linkage between farmers producing biodiverse crops and institutional consumers such as schools, hospitals, and prisons, and support school feeding programs;
- recognize, support, and fund strong farmers-led seed systems for agrobiodiversity crops;
- update national dietary guidelines to ensure inclusion of potential traditional and neglected crops; and
- encourage national awareness campaigns for improving diets and nutrition through the use of agrobiodiversity.

For the Private Sector

Designing biodiversity-friendly markets, supporting ethical supply chains, and investing in agrobiodiversity-linked innovations, from investment in seeds to food processing, mechanization for diverse systems, etc. to meet the growing demand of agrobiodiversity-centered consumption.

- Promote biodiversity branding and implement certification schemes that recognize the sustainability of different products to conserve nature and biodiversity;
- direct selling using e-markets of biodiversity products with innovative and personalized traceability methods;
- identification and investment in niche and mainstream markets for minor and neglected crops;
- create premium prices for products that champion biodiversity conservation and improved diets;
- foster investment in technologies from farm to fork that advance agrobiodiversity, including mechanization, food processing, new products development, etc.;
- integrate (agro)biodiversity indicators in Environmental, Social, and Governance (ESG) plans; and
- connect and strengthen production with distribution of biodiversity-based products.

For Scientists

Encouraging transdisciplinary research, open data sharing, and participatory approaches with farmers and ensuring greater use and production of agrobiodiversity in production systems.

- Genuinely include farmers' technologies, goals, and approaches into research programs, aiming at farmers-led research approaches;
- promote multidisciplinary and trans-disciplinary research to address system criticalities along the food systems;
- promote and design new approaches for participatory action research that includes citizen science approaches and gender-sensitive research;
- develop long-term experiments to refine and improve biodiversity-based systems to optimize productivity, nutrition, and livelihood;
- forge new pathways to bolster farmers-led seed systems;

- test new technologies such as artificial intelligence (AI), remote sensing, and other tools to monitor multiple performance of landscapes under biodiversity-friendly management;
- undertake participatory breeding programs that combine farmers' needs with more advanced breeding techniques to breed for biodiversity-friendly production systems;
- characterize and evaluate minor and underutilized crops for multiple goals, from adaptation to nutrition;
- investigate systematically the relationship between soil biodiversity and cropping systems; and
- promote new curricula in relevant academic faculties for training the next generation of scientists.

We encourage all stakeholders interested in joining a global community advocating for agrobiodiversity to connect *via* the International Agrobiodiversity Congress LinkedIn page and share experiences and knowledge.

Examples of the relevance of agrobiodiversity are illustrated in the case studies presented in the annex.

Annexes

ANNEX 1
Structure of the 3rd International Agrobiodiversity Congress

1. The International Steering Committee

Co-chaired by

Kongming Wu, President, Chinese Academy of Agricultural Sciences

Juan Lucas Restrepo, Director-General, Alliance of Bioversity and CIAT

The International Steering Committee Members:

- CGIAR
- China Agricultural University
- Commission on Genetic Resources for Food and Agriculture (CGRFA)
- Convention on Biological Diversity (CBD)
- Conservation International
- The Crop Trust
- FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)
- The Indian Society of Plant Genetic Resources (ISPGR)
- International Union for Conservation of Nature (IUCN)
- United Nations Environment Programme (UNDP)
- World Farmers' Organisation
- WWF
- Yunnan Agricultural University

2. The International Scientific Committee

Co-chaired by

Carlo Fadda, Research Area Director, Biodiversity for Food and Agriculture, Alliance of Bioversity International and CIAT

Xu Liu, Academician, Chinese Academy of Engineering & Professor, Chinese Academy of Agricultural Sciences

Youyong Zhu, Academician, Chinese Academy of Engineering & Professor, Yunnan Agricultural University

Leads and Co-Leads of the Thematic Sessions by Topic

1. AGROBIODIVERSITY FOR ECONOMIC GROWTH

   Elisabetta Gotor, Alliance of Bioversity International and CIAT

   Ganggang Guo, Chinese Academy of Agricultural Sciences

   Chun Song, Alliance of Bioversity International and CIAT

2. AGROBIODIVERSITY FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

   Jizeng Jia, Chinese Academy of Agricultural Sciences

   Julián Ramírez-Villegas, Alliance of Bioversity International and CIAT

3. AGROBIODIVERSITY FOR IMPROVED ENVIRONMENTAL HEALTH AND BIODIVERSITY

   John García Ulloa, Biovision Foundation

   Chris Kettle, Alliance of Bioversity International and CIAT

Janice Teresa Lee Ser Huay, Nanyang Technological University, Singapore

Yongqi Zheng, Chinese Academy of Forestry

4. AGROBIODIVERSITY FOR HEALTHY DIETS

Gina Kennedy, Alliance of Bioversity International and CIAT

Jiaqi Wang, Chinese Academy of Agricultural Sciences

5. AGROBIODIVERSITY FOR GENDER AND SOCIAL INCLUSION

Amelia Arreguin, Women's Caucus of the Convention on Biological Diversity

Marlène Elias, Alliance of Bioversity International and CIAT

Rui Shi, Southwest Forestry University

6. AGROBIODIVERSITY CONSERVATION AND MANAGEMENT STRATEGIES

Qing Cai, Yunnan Academy of Agricultural Sciences

Michael Halewood, Alliance of Bioversity International and CIAT

Chengyun Li, Yunnan Agricultural University

Ronnie Vernooy, Alliance of Bioversity International and CIAT

3. The Secretariat

Marco Fiorentini, Alliance of Bioversity International and CIAT

Yu-Chun Liao, Alliance of Bioversity International and CIAT

Zongwen Zhang, Alliance of Bioversity International and CIAT / Chinese Academy of Agricultural Sciences

ANNEX 2
Case Studies

The following selection of examples demonstrates a range of integrated approaches linking agrobiodiversity, nutrition, climate resilience, and economic sustainability across different parts of the world.

CASE STUDY 1

WOMEN-LEAD WATER & AGROBIODIVERSITY CONSERVATION IN INDONESIA

LOCATION

Indonesia (Lolong Village, South Lembor subdistrict & Golo Lewe Village, West Kuwus subdistrict, West Manggarai, East Nusa Tenggara)

KEYWORDS

Women leadership, water conservation, agrobiodiversity, climate adaptation.

SUMMARY

Women have pioneered an integrated approach to water and agrobiodiversity conservation that addresses both climate adaptation and gender empowerment. The initiative, known locally as *"laat mata wae"* (water spring monitoring), combines traditional ecological knowledge with systematic conservation practices. The activities are part of the EmPower II program – a UN Women and UNEP initiative implemented by the Women Research Institute (WRI) consortium.

The program has engaged 84 community members, of which 79.8% are women, across four groups, successfully establishing community-based seed banks *(lumbung benih)* to preserve diverse local food varieties. Beyond common legumes are also: *kacang tanah* (peanuts), *kacang hijau* (mung beans), and *kacang merah* (red beans), among others. The initiative also focuses on Indigenous varieties including *mesak* sorgum and *longa* sesame. These heritage crops carry deep cultural significance that were traditionally used by elders to enrich nutritious vegetable dishes and served as a substitute during times of scarcity. These seeds are stored using traditional containers e.g. *teru*, maintaining cultural practices while ensuring food security and preserving hidden agricultural potential.

Water conservation efforts center on protecting natural springs through reforestation with over 300 native tree seedlings, for instance the *Pinang* Areca palm tree. Women have assumed leadership roles in monitoring water sources, building on their traditional responsibilities for water management in domestic contexts but expanding to community-wide environmental stewardship.

Women have also developed local production of organic fertilizers, such as EM4, bokashi, liquid fertilizer, organic KCL, and natural pesticides and fungicides. Applied to 16 vegetable plots, dependence on chemical inputs is reduced, contributing to climate mitigation.

The program has successfully influenced local policy through dialogue with village governments, securing commitments for women's empowerment budget allocations and joint monitoring-evaluation mechanisms. This bottom-up approach demonstrates how women's leadership in environmental conservation can create sustainable pathways for climate adaptation while preserving agrobiodiversity and strengthening local food systems.

The making of organic fertilizer in Lalong Village

Harvest white sesame in Golo Lewe Village

RELATED LINK https://www.facebook.com/share/v/1AQABcBibf/

SOURCE Women Research Institute

TO LEARN MORE, PLEASE CONTACT Sita Aripurnami ✉ sita@jimsch.org

CASE STUDY 2

LOCAL RICE VARIETIES BOOST POLYCULTURE AND VILLAGER LIVELIHOODS

LOCATION

China

KEYWORDS

Livelihoods, local crop varieties, rice-fish farming systems, terraces, cooperative models, market incentives.

SUMMARY

Based on the FAO-Global Environment Facility (GEF) funded project "On farm conservation and sustainable use of genetic diversity of crops originated in China" and implemented by the Ministry of Agriculture and Rural Affairs (MARA), in Yuanjiang County, Yunnan Province, farmers organized to plant local rice varieties that are target conservation varieties named *Mazha Gu* and *Honghe Zigu* in a planned and unified manner. Experimental field trials conducted for improving the yield, quality, disease and pest resistance increased from 40 mu (亩) (2.67 ha) to more than 100 mu (亩) (6.67 ha), while the promotion area was expanded to about 1,000 mu (亩) (66.67 ha). To maintain the enthusiasm of farmers to plant these local varieties, the project helped Bamu Village establish the company *Alangbangke Village Agricultural Service Co., Ltd.,* which is mainly responsible for developing and selling products from these local varieties. With the purchase price of 1 Chinese yuan renminbi (RMB) per kg higher than the market price, the farmers' income could be increased, thereby encouraging them to plant more local varieties. Therefore, the project could reach the objectives of both improving farmers' livelihood and conserving local varieties.

At the same time, villagers' traditional knowledge includes fish farming in terrace fields after the winter harvest. The company distributed grain stubble fish to farmers to raise in the fields, and the farmers could get 600 Chinese yuan RMB per mu (亩) (667 m2) per year. Through the implementation of the project, the village-run company drove more than 500 farmers through the cooperative model of "company + base + farmers", innovated the sales model of "from terrace products to tables", and sold more than 10,000 kilograms of *Mazha Gu* and more than 9,000 kilograms of *Honghe Zigu,* with total income of 520,000-yuan RMB. By planting red rice, glutinous purple rice, etc. and promoting the ecological planting and breeding model of "rice, fish, and duck polyculture," the project achieved effective conservation of local varieties, protection of Yunhai terraced landscape, continuation of farming culture, and improvement of farmers' livelihood.

RELATED LINK https://bit.ly/3V203gS

SOURCE Long Baoyu, CEO of Alangbangke Village Agricultural Service.

TO LEARN MORE, PLEASE CONTACT ✉ huangjie.bdpmo@vip.163.com

CASE STUDY 3

BREEDING FOR INTRA-FIELD DIVERSIFICATION REDUCES PESTICIDE USE

LOCATION

France

KEYWORDS

Intercropping, variety mixtures, plant-plant interactions, disease, pest and weeds control, breeding for mixing ability, indirect genetic effects.

SUMMARY

Reducing pesticide use is a major challenge for transitioning to more sustainable agriculture. One promising pathway lies in increasing the genetic and functional diversity of crops at the field scale. Cultivar mixtures and crop mixtures (intercropping) can disrupt pest and disease dynamics through ecological mechanisms such as barrier effects, induced resistance, and natural enemy enhancement.

However, designing and implementing effective mixtures requires new knowledge, adapted breeding strategies, and supportive seed systems. The project "Mobilizing and Breeding Intra and inter-specific crop Diversity for a systemic change towards pesticide-free agriculture" (MoBiDiv) was launched to address these challenges through interdisciplinary research and stakeholder collaboration.

MoBiDiv (2021–2026), funded by the French National Research Agency, focuses on cultivar and species mixtures as tools to reduce chemical inputs. A key objective is to develop varieties specifically bred for performance in mixtures, a major gap in current breeding programs.

The project brings together over 20 interdisciplinary research teams – including geneticists, agronomists, epidemiologists, ecophysiologists and economists – to investigate both the ecological functioning of mixtures and the socio-economic levers for their adoption.

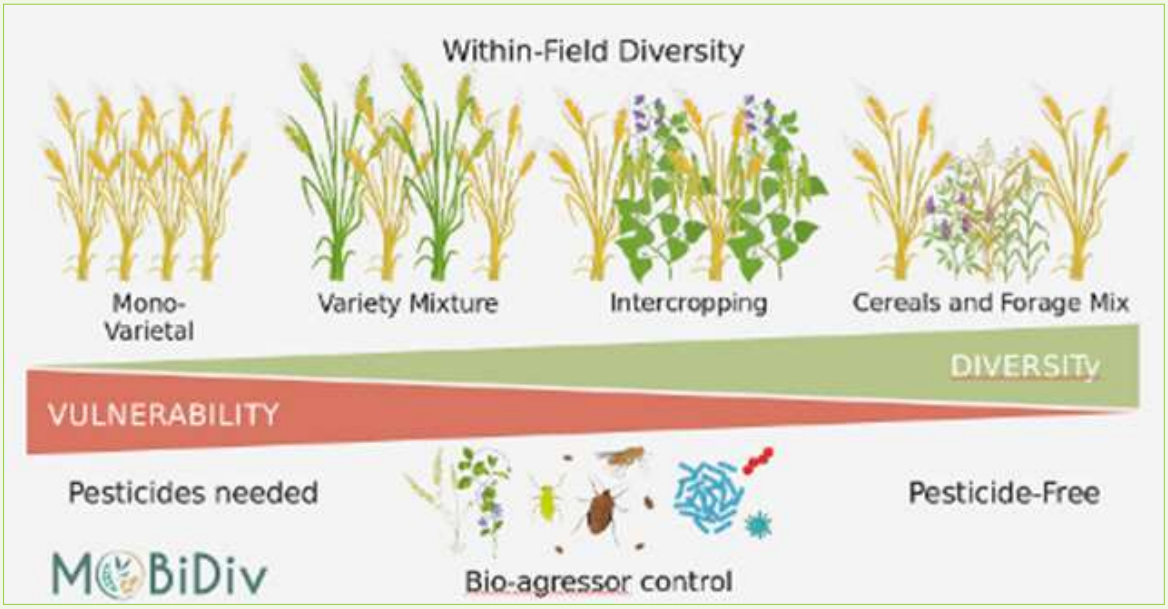
MoBiDiv explores how plant–plant interactions in mixtures affect plant immunity and pest dynamics. Combining genomics, eco-physiological modeling, and field experiments, researchers study mixtures involving wheat, pea, and forage species across gradients of genetic and functional diversity.

Innovative breeding and decision-support tools are developed to design and evaluate mixtures, such as participatory breeding involving farmers to adapt alfalfa varieties to wheat intercropping.

The project also addresses structural barriers in the seed sector, traditionally geared toward homogeneity: sole-cropping, with mono-genotypic variety per field. By exploring regulatory and

market adaptations, MoBiDiv supports the design and use of heterogeneous varieties and mixed cropping systems, especially in organic farming.

MoBiDiv exemplifies how interdisciplinary research can foster systemic change toward more resilient and pesticide-free agriculture.



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SOURCE INRAE Quantitative Genetics and Evolution, GQE – Le Moulon, Gif sur Yvette, France
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CASE STUDY 4

COMMUNITY SEED BANKS INCREASE AGROBIODIVERSITY AND INCOMES IN KENYA AND UGANDA

LOCATION

Kenya, Uganda

KEYWORDS

Indigenous knowledge, local knowledge, seed systems, agrobiodiversity conservation, sustainable agrobiodiversity use, community action, agrobiodiversity value chains.

SUMMARY

Rural communities across Africa have lost countless local crops to commercial varieties over recent generations. In just a few decades, commercial varieties have struggled to deliver long-term food and nutritional security, while ruining soils and farmers' bottom lines. Fifteen years after the establishment of community seed banks (CSBs) in Kenya and Uganda, many farmers are reversing course by producing a greater variety of underutilized crops, conserving them in the local communities, improving food security and nutrition, and increasingly generating sustainable profits from community seed management.

Starting around 2010, farmers in Kenya and neighboring Uganda established community seed banks as part of broader, science-backed efforts to tackle climate change, food insecurity, and biodiversity loss.

Research on eight of these seed banks from 2010 to 2023 found the conserved and produced 90 resilient and nutritious crop species. These seed banks, supported by the Alliance of Bioversity International and CIAT, generated USD 100,000 in local income and empowered women, who make up 72% of community seed bank participants.

In addition to diversifying diets and incomes, the seed banks offer affordable alternatives to ensure that productive land is not unplanted due to lack of resources to buy costly seeds and inputs. "In the long run, this is about food security," said Dan Nyarwath, a farmer in Kenya's Jimo East, during a 2024 visit to the community's seedbank. "No fields will be left fallow because the farmers don't have access to seeds."

Beyond their immediate benefits, CSBs became pillars of CGIAR's NATURE+ Initiative (now part of CGIAR's Multifunctional Landscapes Science Program) in 2022. In Kenya, for example, the Initiative supported communities to establish aggregated farms, which integrated several nature-positive solutions in agriculture, including organic waste recycling, landscape restoration, crop diversification, and native-tree planting. CSBs not only provided seeds for the farms, but also the

enabling environment for community members to collaborate with each other, researchers, and local authorities in facilitating local food system transformation on the ground.

The Alliance of Bioversity International and CIAT has supported or established more than 80 CSBs across several continents. Our story demonstrates that CSBs, therefore, are models to be replicated across geographies as part of holistic approaches to benefit people and the planet.

The community seed bank in Agoro East, Kenya is the go-to source for traditional crop seeds and is a foundational piece of NATURE+ aggregated farms. Photo credits: Douglas Gayeton, The Lexicon. Non-commercial use allowed with attribution.

RELATED LINK Community seed banks boost seed, food and nutrition security for thousands in Kenya and Uganda

SOURCE Alliance of Bioversity International and CIAT

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CASE STUDY 5
MIXED FIELDS PROTECT CROPS

LOCATION
China (Yuanyang Terraces, Yunnan)

KEYWORDS
Rice diversity, plant-plant interactions, evolution of pathogen populations, methane production.

SUMMARY
Sustainable crop protection in rice cultivation is a pressing challenge due to the heavy reliance on pesticides to maintain yields and the significant environmental impact of methane emissions from irrigated fields that contributes notably to carbon emissions. Addressing these issues requires strategies that both reduce pesticide use and control methane emissions to ensure the long-term sustainability of rice farming. One promising solution is the use of cultivar mixtures – growing different rice varieties together – to increase crop diversity. Mixtures have proven effective in controlling disease outbreaks and stabilizing yields and are relatively easy for farmers to implement since they require minimal changes to their existing practices. However, the challenge lies in determining the optimal combinations of varieties.

The "Plantomix 2" project tackles this challenge by utilizing extensive genomic data to design optimal intra-specific diversity in rice. The scientific objectives are to establish genomic guidelines for creating rice mixtures that provide resistance to diseases without relying on pesticides and reduce methane emissions. The project focuses on the Yuanyang rice terraces, a system that has been studied in-depth through long-term collaboration and comprehensive genomic analysis of both rice and pathogens. Notably, the project showed that traditional landraces like Acuce possess a high diversity of immune-related genes, enhancing disease resistance, while direct plant-to-plant interactions can further boost immunity. Preliminary evidence also suggests that Acuce roots can recruit soil microbiomes with varying capacities for methane production.

Strategically, the "Plantomix 2" project intends to promote crop diversification by organizing a series of international conferences on the topic of Crop Diversity for Crop Protection. This aligns with broader initiatives, such as the Center for Carbon Neutrality between France and China, and emphasizes the need to advocate for sustainable agricultural practices that protect both biodiversity and environmental health.

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SOURCE International Associated Laboratory "Plantomix 2", INRAE (Plant Health Institute of Montpellier - PHIM, Montpellier, France) – YNAU (State Key Laboratory for Conservation and Utilization of Bio-Resources in Yunnan - LCUBY, Kunming, China)

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CASE STUDY 6

REVIVING AND MARKETING ANCESTRAL AGRICULTURAL FOOD PRODUCTION PRACTICES TO PRESERVE BIODIVERSITY AND SUPPORT NUTRITION IN MEXICO

LOCATION
Mexico

KEYWORDS
Agrobiodiversity, nutrition, milpa, resilience.

SUMMARY
Mexico harbors one of the world's richest reservoirs of agrobiodiversity, much of which is conserved by smallholder farmers through traditional agricultural systems such as milpas – a method in which maize is intercropped with other species, such as beans, squash, and other vegetables. These dynamic systems support the conservation of a wide range of local varieties and their wild relatives and play a critical role in sustaining dietary diversity and ecological resilience.

However, the expansion of large-scale, intensive monocultures and the decline of traditional farming practices have increasingly undermined this diversity. These shifts not only erode genetic resources but also heighten the vulnerability of rural communities to environmental and economic shocks, with significant consequences for food security and nutrition.

Through an innovative project on conserving genetic diversity and traditional agricultural systems in Mexico, FAO, GEF and CONABIO (a government commission to research and sustainably use biodiversity) have been able to reverse the trend across six states. The project supported 77 community and family seed banks, conserving 155 native species and varieties. Over 1,400 farmers were engaged in improving the management of local and regional agrobiodiversity, creating networks of seed custodians and implementing seed exchanges between communities. Capacity building activities reached nearly 10,000 producers and promoted agroecological practices across 5,200 hectares, with indirect benefits estimated to cover over one million hectares. Consumer-oriented actions (including market studies and awareness campaigns) highlighted the nutritional, ecological, and cultural value of native crops. These efforts stimulated demand and fostered direct linkages between consumers and producers, creating a positive feedback loop for production diversification and market development.

Building on the success of this initiative, FAO – in close collaboration with CONABIO and with continued support from the GEF – will build on the foundations laid by this project to further advance the conservation and sustainable use of biodiversity for food and nutrition.

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RELATED LINK https://bit.ly/3JLEObS

SOURCE Food and Agriculture Organization of the United Nations (FAO)

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CASE STUDY 7

AGUAPAN: A SEED GUARDIAN MODEL OF BENEFIT-SHARING

LOCATION

Peru

KEYWORDS

Integrated conservation, biodiversity credits, Native potato custodians, Farmers' rights.

SUMMARY

The Native Potato Seed Guardian Network *(AGUAPAN in Spanish)* was established in 2014 and unites more than 100 seed guardian families from nine Andean regions of Peru. Together, they conserve over 1,000 native potato varieties – between 50 and 300 per family – while pioneering innovations that strengthen both biodiversity and rural livelihoods.

One key innovation is a **direct benefit-sharing mechanism** based on biodiversity credits, supported by private sector partners such as HZPC Holland and AGRICO. These companies provide a fixed annual contribution, enabling each guardian family to receive approximately USD 260 per year. This model not only rewards conservation efforts but also helps private companies meet their environmental commitments.

A second innovation is AGUAPAN's **inclusive governance model,** which empowers leadership, upholds farmers' rights, promotes youth participation, and prioritizes family well-being. The network is guided by a general assembly, national and regional boards of directors, and a support team that includes the Yanapai Group, the International Potato Center (CIP), the National Institute of Agricultural Innovation (INIA), the Peruvian Society of Environmental Rights (SPDA), the Pataz Association, and the Native Potato Interpretation Center.

AGUAPAN plays a vital role in Peru's potato seed systems, functioning as a decentralized seed security network that provides access to communities, institutions, and fellow farmers. It also promotes **"Misky Papa",** a collective brand that markets varietal mixes to high-value niches, creating new income opportunities for families. Building on this success, AGUAPAN's model is now being adapted for other crops and replicated in neighboring countries.

Members of AGUAPAN present in the Annual Meeting in Huancayo – Peru in October 2022. Photo credits: Yanapai Group 2022.

RELATED LINK https://openknowledge.fao.org/handle/20.500.14283/ca8101en

SOURCE International Potato Center (CIP), Israel Navarrete

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