



THE FUTURE OF FOOD: SEEDS OF RESILIENCE

A COMPENDIUM OF PERSPECTIVES
ON AGRICULTURAL BIODIVERSITY
FROM AROUND THE WORLD

SYNTHESIS OF FINDINGS

Full Compendium available at www.futureoffood.org

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This compendium of papers was commissioned by the Global Alliance for the Future of Food in collaboration with the authors for use by Global Alliance members to stimulate information-sharing, learning, and collective action. The Global Alliance has chosen to make it available to the broader community to contribute to thinking and discussion about sustainable food and agriculture systems reform. It constitutes the work of independent authors. Any views expressed in this report do not necessarily represent the views of the Global Alliance or of any of our members.

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The Global Alliance for the Future of Food cultivates healthy, equitable, renewable, resilient, and culturally diverse food and agriculture systems shaped by people, communities, and their institutions.

We are a unique collaboration of philanthropic foundations that have come together to strategically leverage resources and knowledge, develop frameworks and pathways for change, and push the agenda for more sustainable food and agriculture systems globally. Representing countries across the globe—with diverse interests and expertise spanning health, agriculture, food, conservation, cultural diversity and community well-being—the Global Alliance shares a belief in the urgency of advancing sustainable global agriculture and food systems, and in the power of working together and with others to effect positive change.

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THE FUTURE OF FOOD: SEEDS OF RESILIENCE

A COMPENDIUM OF PERSPECTIVES ON AGRICULTURAL BIODIVERSITY FROM AROUND THE WORLD

KEY MESSAGES

- 1. Diverse and robust local seed systems are central to sustainable food systems that are renewable, resilient, equitable, diverse, healthy, and interconnected.**
- 2. Farmers have a crucial role in improving seed varieties and enhancing agricultural biodiversity, a role they have played throughout the history of agriculture.**
- 3. The knowledge and practices of smallholder farmers, particularly those who are women and Indigenous Peoples, are central to the survival of local seed systems.**
- 4. The value of resilient and diverse seed systems goes far beyond any economic measure. Community based seed systems are connected to diverse cultural and culinary traditions, health and wellness, resilient agroecological landscapes, and sustainable local economies.**
- 5. Maintaining and enhancing agricultural biodiversity is critical in light of global challenges such as climate change, and food and nutrition security.**
- 6. There is an urgent need to support community based and farmer managed seed systems in order to protect and enhance agricultural biodiversity.**
- 7. Farmers should not be limited in their ability to access, exchange and improve the seeds they use—whether they are locally managed, government produced, or commercial seed varieties from other regions of the world.**
- 8. Organizations led by Indigenous Peoples, women farmers and smallholder farmers need greater voice and influence in the development of local seed policy as well as the international governance systems that affect and regulate seeds.**
- 9. There is great potential in farmers and the more formal seed establishment coming together to co-create solutions where they have a common agenda.**
- 10. Strategic opportunities for positive change include: to continue to research and document the importance of community based seed systems, to support seed leaders to engage in policy advocacy, and to leverage additional funding from philanthropy, governments, and bilateral agencies for community based seed systems.**



FOREWORD

Increasing the availability of agrobiodiversity will become more and more important, not only in the pursuit of improved crop performance, but also in the context of adaptation to climate change, greater resilience, improved nutrition, maintaining the socio-economic balance of farming communities, and the rehabilitation of degraded ecosystems.

— EMILE FRISON AND TOBY HODGKIN

We couldn't agree more. The Global Alliance for the Future of Food is a strategic network of independent foundations with divergent views and perspectives; yet when it comes to the preservation, maintenance, and enhancement of agricultural biodiversity, the Global Alliance believes that diverse and robust seed systems are central to sustainable food systems that are renewable, resilient, equitable, diverse, healthy, and interconnected. We also believe that there is an urgency to supporting community based and farmer managed seed systems in order to protect and enhance seed diversity.

Because of the centrality of resilient seed systems to our collective future of food, and because of the urgency to attend to the threats currently placed upon them, the Global Alliance commissioned an opportunities report, written by Emile Frison and Toby Hodgkin, and a dozen associated commentaries written by diverse leaders in the field from across the globe. The opportunities report and commentaries constitute *The Future of Food: Seeds of Resilience*, which we are excited to release to a broad array of stakeholders, from private enterprise to policy makers to farmers and funders.

The compendium captures a rich diversity of perspectives related to seed systems and agricultural biodiversity, reflecting current research and firsthand experience in the field. This includes plant breeders, seed companies, farmers, academics, foundation staff, and many others with the associated disparities of opinion. Seed systems are a vast area of exploration and are dusted with strong beliefs and sometimes firmly held philosophies. We have encouraged—and look forward to further exploring—this diversity.

But while the contributors and authors of this report come with different world views, have diverse perspectives, and offer differing opinions, there is consensus that the value of resilient and diverse seed systems goes far beyond any economic measure: community based seed systems are connected to diverse cultural and culinary traditions, health and wellness, resilient agroecological landscapes, and sustainable local economies. What's more, maintaining and enhancing agricultural biodiversity is critical in light of global challenges such as climate change and food and nutrition security.

To do so, however, we must overcome a number of significant hurdles. Seed diversity is being eroded and community based seed systems, representing tremendous complexity, are under threat. Farmers do not have adequate

The Global Alliance believes that diverse and robust seed systems are central to sustainable food systems that are renewable, resilient, equitable, diverse, healthy, and interconnected.

representation within the international governance systems that regulate seeds. Communities are feeling the negative impacts of the increasing privatization of seeds. The current intellectual property regime restricts traditional and local seed saving practices. Moreover, the world of farmer seed systems and the world of the more formal seed establishment too often remain in their own orbits hampering the potential of co-creating solutions and coming together as positive participants where they have a common agenda. When seed systems are disconnected from farmers—and vice versa—farmers are unable to contribute to protecting and enhancing agricultural biodiversity—an important role they have historically played.

And thus we sit at a crossroads. This is a historic moment for seed systems. We have a number of seemingly overwhelming challenges, and yet from what we learn from our colleagues, whose voices you will hear in this compendium, there is reason for hope if we collectively embrace the recommendations and positive pathways forward that they map for us.

The contributors to the compendium offer both thoughtful and challenging recommendations for conserving and enhancing agricultural biodiversity, including:

- developing a coordinated advocacy strategy in support of community based seed systems;
- providing greater resources and support to community based seed systems; and
- strengthening the central role women and Indigenous Peoples play in agricultural biodiversity.

In the coming months, the members of the Global Alliance will be exploring how to move these ideas forward, especially as they relate to the imperative to continue to research and document the importance of community based seed systems, to support seed leaders to strategically engage in advocacy, and to leverage additional funding for community based seed systems.

It will, however, require significant resources to adequately and effectively support this important work on agricultural biodiversity—going well beyond philanthropy. We invite all stakeholders to listen to the voices in *The Future of Food: Seeds of Resilience*, to appreciate the urgency of action, and to lend your needed contribution to this most essential issue at the foundation of sustainable food systems: seeds.



A handwritten signature in black ink that reads "Ruth Richardson".

RUTH RICHARDSON

Executive Director, Global Alliance for the Future of Food



SYNTHESIS OF FINDINGS

The diversity of traditional seeds saved by peasant farmers is rooted in the knowledge that seeds are the foundation of life, and more than a source of food—they are a history and culture handed down by our ancestors... This holistic thinking about the value and sacredness of seed over the past generations has been the basis for sustaining diversity and hence stability, in the surrounding environment.

— NELSON MUDZINGWA,
ZIMBABWE SMALLHOLDER ORGANIC FARMERS FORUM

Agricultural biodiversity is essential to the future of food. A deep pool of biodiversity will ensure that we have plant species and varieties that can withstand changing weather patterns. Agricultural biodiversity is directly connected to global nutrition, dietary health, cultural and culinary diversity, and to the resilience of local economies and markets. Seeds are central to the everyday practices of small-scale farmers that feed 70 per cent of the world's population.

In order to understand the landscape of initiatives working to advance seed diversity globally, the Global Alliance commissioned a compendium containing an opportunities report and 12 commentaries. The diverse perspectives that emerged offer insight into how Global Alliance members and members of other organizations can bolster agricultural biodiversity in ways that prioritize and strengthen farmer centred and community based efforts around the world.

“Community based approaches have been given more voice in this compendium in an effort to bolster their importance and shine a light on their fundamental contribution to sustainable food systems.”

Drawing on a literature review and key informant interviews, leading agricultural biodiversity experts Emile Frison and Toby Hodgkin wrote the opportunities report, entitled “Strategic Opportunities to Strengthen Community Based Approaches to Seed Agrobiodiversity.” A broad range of experts—from organic farmers and community activists to researchers and scientists within the seed industry—read the report, and each wrote a brief commentary outlining what they see as threats to agricultural biodiversity, as well as their recommendations on how Global Alliance members and others can best promote farmer managed and community based efforts and strengthen the diversity and resilience of both seeds and seed systems.

The perspectives represented in the compendium illustrate a nuanced discussion on agricultural biodiversity, at times aligned and at times divergent. The majority of experts asked to contribute to this compendium support community based approaches to agricultural biodiversity conservation, a perspective often underappreciated in global discussions and policy circles where more formal, institutional, *ex situ* approaches have been the primary focus. Community based approaches have been given more voice in this compendium in an effort to bolster their importance and shine a light on their fundamental contribution to sustainable food systems. Many of the contributors to this compendium articulate that an important opportunity is being missed—an opportunity to foster better linkages and partnerships across diverse seed systems and across approaches to agricultural biodiversity. This opportunity aligns well with Global Alliance members’ mandates to support organizations and networks that strengthen community based and farmer centred seed systems.

The synthesis that follows represents a summary of the contributors’ key points and the shared themes woven throughout the compendium. To understand the nuanced, rich contributions of each of the authors, a full reading of the entire compendium is encouraged; however, this synthesis aims to provide an overview that draws upon the diversity of perspectives.

AGRICULTURAL BIODIVERSITY AT RISK: MAKING THE CASE

The urgency for agricultural biodiversity conservation is well documented. In its first global assessment of the world’s flora, published in May 2016, the Kew Royal Botanic Gardens, documents that 21 per cent of global plants are at risk of extinction (Royal Botanic Gardens, Kew, State of the World’s Plants. 2016).

Emigdio Ballon of the Pueblo of Tesuque provides startling detail: “In spite of its vital importance for human survival, agricultural biodiversity is being lost at an alarming rate. It is estimated that in the past, some ten thousand species have been used for human food and agriculture. Currently, no more than 120 cultivated species provide 90 per cent of human food supplied by plants, and

“A mere four plant species (potatoes, rice, maize and wheat) and three animal species (cattle, swine and chickens) provide more than half of our food supply.”

of those, only 12 plant species and five animal species alone provide more than 70 per cent of all human food. A mere four plant species (potatoes, rice, maize and wheat) and three animal species (cattle, swine and chickens) provide more than half of our food supply. Hundreds of thousands of farmers’ heterogeneous plant varieties and landscapes that existed for generations in farmers’ fields until the beginning of the twentieth century have been substituted by a small number of modern and highly uniform commercial varieties.”

At the simplest level this reduces our ability to respond to plant diseases and changing environmental conditions using different, possibly more resilient, species. Climate change and accelerated environmental change are putting increased pressure on our food sources, placing even resilient species at risk. Agricultural biodiversity loss compounds the crisis of hunger and malnutrition, the loss of indigenous knowledge, the erosion of dietary diversity, and local food economies.

The authors of the opportunities report and the accompanying commentaries outline a number of threats to agricultural biodiversity which they feel must be addressed. The lack of formal recognition of farmer managed and community based seed systems is a key concern that has implications for local, national and international seed policies as well as investment flows. Government support of proprietary commercial seed research over farmer centred, participatory plant breeding approaches undermines the capacity of farmers to improve their own plant varieties, and therefore increase plant diversity to account for characteristics that they most value. Farmers are necessarily flexible, adaptive, and responsive to their local environmental contexts, which is crucial for resilient food systems. Not engaging farmers directly in seed research is a missed opportunity for creative partnerships between formal and informal, and private and public sector approaches to agricultural biodiversity conservation.

Other pressures are noted as well: rural-urban migration, population growth, the consolidation of the seed industry, and the global focus on increasing agricultural productivity. These combined pressures—local/global, environmental/social, and political/economic—are threatening the viability of thousands of seed varieties.

In light of these threats, compendium authors turn quickly to solutions. The next two sections of this synthesis of findings outline the principal themes and recommendations that emerge from the compendium.

SEEDS AND THE FUTURE OF FOOD: COMMUNICATING THE RELEVANCE

“Seeds are the first link in the food chain and the repository of life’s future evolution. As such, it is our inherent duty and responsibility to protect them and to pass them on to future generations.”

AGRICULTURAL BIODIVERSITY IS CRITICAL TO GLOBAL FOOD AND NUTRITION SECURITY, SMALLHOLDER PROSPERITY AND RESILIENT LOCAL ECONOMIES

Unanimously, the diverse contributors to the compendium emphasize the importance of seeds to the future of food. Nelson Mudzingwa from the Zimbabwe Smallholder Organic Farmers Forum speaks about the importance of maintaining and enhancing agricultural biodiversity. “Seeds are the first link in the food chain and the repository of life’s future evolution. As such, it is our inherent duty and responsibility to protect them and to pass them on to future generations. The protection and strengthening of community seed systems is derived from the understanding that seed was given by the Creator and it is the farmer’s basic right to keep seed. The growing of seed and the free exchange of seed among peasant farmers has been the basis of maintaining a stable biodiversity and a source of food security. Supporting and enhancing traditional practices on seed saving, especially as practiced by elderly women, who have bred seed freely in partnership with each other and with nature, will further increase the diversity of that which nature gave us, for biodiversity and cultural diversity mutually shape one another.”

FROM OUR CONTRIBUTORS

BUILDING A STRONG FARMER MOVEMENT TO PROTECT SEEDS IN ZIMBABWE

Nelson Mudzingwa, Zimbabwe Smallholder Organic Farmers Forum

Members of the Zimbabwe Smallholder Organic Farmers Forum (ZIMSOFF) have created a strong movement to save their traditional seeds. ZIMSOFF’s work addresses their challenges to recover food sovereignty and achieve agrarian reform. Nelson Mudzingwa articulates local concerns over the loss of consumer knowledge of food, as well as the corporate control of food and privatization of the food system. To confront these challenges, Mudzingwa emphasizes the importance of working with farmers and households to support seed exchanges and community seed banking. These local networks and relationships are central to resilient community based and farmer managed seed systems.

ZIMSOFF works at the grassroots and household level to influence change horizontally and vertically. Household members know each other and can easily connect, learn from each other, exchange seeds, protect seed banks, and monitor seed quality. ZIMSOFF members have continued to multiply their diverse traditional and open pollinated seed varieties, organizing farmer field days, seed and food fairs, campaign workshops and exchange visits to build capacity of the participating farmers.

“How do we improve resilience and risk management strategies and maintain agrobiodiversity while increasing the productivity and prosperity of smallholder farmers? And how do we limit environmental pressures as we meet these challenges?”

A number of contributors also emphasized the importance of agricultural biodiversity in the context of changing climate conditions. Cary Fowler, former Executive Director of the Global Crop Diversity Trust, argues that farmers need to be engaged to experiment with different varieties to ensure optimal adaptation to changing climate conditions.

Jim Gaffney and Valasubramanian Ramaiah of DuPont Pioneer write that seed is the fundamental input for sustainable agriculture and the foundation of successful farming for smallholder farmers. This contribution differs significantly from the other perspectives in the compendium in that “the use of improved varieties and hybrids and greater use of agronomic inputs cannot be considered separate from, or in opposition to, the informal seed system or conservation of agrobiodiversity.”

Additionally, Gaffney and Ramaiah argue that “hybrid crops and improved agronomics may also address environmental issues by intensifying agriculture on less land.”

They pose important questions for consideration: How do we improve resilience and risk management strategies and maintain agrobiodiversity while increasing the productivity and prosperity of smallholder farmers? And how do we limit environmental pressures as we meet these challenges?

WOMEN AND INDIGENOUS PEOPLES PLAY A CENTRAL ROLE IN AGRICULTURAL BIODIVERSITY

Emigdio Ballon and Winona LaDuke call attention to the importance of Indigenous Peoples and communities to agricultural biodiversity. Ballon writes: “There are thousands of Indigenous communities throughout our Mother Earth fighting to protect their inherent rights to practice their traditions and grow their foods and seeds. They seek to draw attention to overlooked food crops in the world so that these communities, their foods and seeds are not forgotten or destroyed by genetic modification. The crops are not yet truly lost; indeed, most are well known in many areas of the world, especially among Indigenous groups, but protecting these varieties is the main focus of international scientists and people trying to protect the food.”

The role of women in agricultural biodiversity conservation was highlighted by many of the contributors. The African Centre for Biodiversity writes, “The role of rural women and smallholder farmers in African society has been profoundly undervalued, despite the fact that around 80 per cent of Africa’s population is dependent on smallholder agriculture—the backbone of the rural economy—where women provide 70 per cent of the farm labour. When it comes to seed, women are the custodians at the centre of seed saving, with significant importance in ensuring food security and genetic diversity.”

FROM OUR CONTRIBUTORS

PRESERVING THE GENETIC DIVERSITY OF FRUIT IN TAJIKISTAN

Muhabbat Mamadalieva and co-authors

Zan va Zamin (Women and Earth) works with local communities in the mountainous areas of Tajikistan, across Khovaling, Muminobod and Shuroabad. During the Soviet era, agriculture became centralized and many local crops were no longer grown. After this period of focus on hybrid seeds and varieties, the *Zan va Zamin* project was launched to support the restoration and rehabilitation of traditional forms of agriculture. The project supports local varieties of agricultural products to be reclaimed, as well as community based seed cultivation.

The project conserves the agricultural biodiversity of fruit crops by working with farmers who are growing rare varieties *in situ* and who have started a rare fruits nursery. Muhabbat Mamadalieva and co-authors stress the importance of formally recognizing local varieties, hybrids, and grafts cultivated by local farmers. They describe how farmer-to-farmer and farmer-to-scientist exchanges, partnerships and training are central to enhancing agricultural biodiversity, as is identifying and working with local seed champions. The preservation of agricultural biodiversity is also dependent on the culinary use of these crops by households and local institutions.

Bettina Haussmann, who works across Mali, Burkina Faso, and Niger with the Collaborative Crop Research Program, also emphasizes women's special role in agricultural biodiversity and the link to nutrition: "Working specifically with women farmers to cultivate and maintain local crop and varietal diversity could be an opportunity to (re-) link agriculture with nutrition, to enhance dietary diversity in rural families and to achieve desired nutritional outcomes and the reduction of malnutrition and hidden hunger."

SEEDS ARE SACRED AND HOLD VALUE AND MEANING BEYOND MARKETS

The value of seeds—far beyond yield per acre, and beyond the income generated by the sale of crops—was another central theme identified by compendium contributors. This value includes agricultural biodiversity's connection to local culinary traditions, taste, nutrition, the value of diverse products in local markets, and the value of ecological resilience.

Because of the significant value and meaning of seeds across jurisdictions and contexts, seeds are considered sacred by many of the contributors. Emigdio Ballon writes, "Life forms, plants, and seeds are all-invoking, self-organized, sovereign beings. They have intrinsic worth, value and standing.... Uniformity is being pushed as positive criteria, in order to legitimize corporate control over seeds.... Patents on seeds are legally wrong because seeds are not an invention. Patents on seeds are ethically wrong because seeds are life forms. They are our kin. They are members of our Earth family. Owning life by claiming it to be a corporate invention is both ethically and legally wrong."

FROM OUR CONTRIBUTORS

REALIZING THE POTENTIAL OF ACCESS TO SEEDS FOR SMALLHOLDERS IN INDIA

Jim Gaffney and Valasubramanian Ramaiah, DuPont Pioneer

In the agrobiodiversity-rich Koraput district of Odisha, India, smallholder farmers use traditional varieties and practices, contributing to *in situ* agricultural biodiversity conservation. The area is recognized for its rich diversity of Asian cultivated rice, and is known to be one of the centres of origin of these varieties. However, lack of support mechanisms and relevant training to enhance skills in the seed selection process are constraining the needed scale of quality seed production.

These constraints are being addressed through a variety of public-private partnerships. Several private seed companies and cooperatives are supplying an increasing proportion of rice seed, in addition to two public seed agencies. The open access to source seed, the active participation of smallholder farmers, the availability of growers and processing facilities on a contract basis and a well-developed marketing network have reduced transaction costs, enabling the emergence of a wide range of seed enterprises, particularly in the private sector.

This system utilizes the best of what both the formal and informal seed systems have to offer, and, perhaps most importantly, has provided smallholder farmers with market access and more options for their farming enterprise.

“By valuing specific crops and varieties as healthy food and possibly creating a local value chain and local markets, farmers can be encouraged to add these crops and varieties to their existing portfolio, for improving family nutrition and also for income generation purposes. The use of this diversity will thus ensure that it is not lost.”

The culinary uses of crops (flavour, texture, nutritional and medicinal values) are important when considering the value of seeds. Humberto Ríos Labrada of ICRA, speaking about his experience working with farmers and breeding landraces, states, “Culinary criteria of the varieties were extremely important in keeping more diversity on-farm. Women organized cooking tests as an important criteria for varietal selection. Mostly male farmers voted for varieties with high yield and associated characteristics. Female participants voted for varieties related to culinary properties. In the cooking tests, men noted that more than 80 per cent of the varieties tested were of good cooking quality, whereas women were more rigorous.”

Bettina Haussmann stresses the link between the everyday value of agricultural biodiversity and its preservation: “By valuing specific crops and varieties as healthy food and possibly creating a local value chain and local markets, farmers can be encouraged to add these crops and varieties to their existing portfolio, for improving family nutrition and also for income generation purposes. The use of this diversity will thus hinder that it gets lost.”

COMMUNITY BASED SEED SYSTEMS ARE A STRATEGY FOR RESTORING, MAINTAINING AND REHABILITATING AGRICULTURAL BIODIVERSITY

The authors overwhelmingly spoke of the need to restore, maintain and rehabilitate agricultural biodiversity through a focus on community based seed systems. For example, Maryam Rahmanian explains: “Community based seed systems are obviously the result of a *collective* endeavour—no individual could undertake this work on their own, so it’s the collective nature of the seed system that has to be at the heart of any effort to protect and strengthen it.”

“Given the diversity and complexity of local contexts, methods to sustain, protect and strengthen community based seed systems will have to be diverse, tailored and adaptive.”

Jean-Louis Pham of Agropolis Fondation describes how community based seed systems are diverse and complex entities: “There is a diversity of seed systems because of the diversity of eco-geographical and economic conditions, of the crop reproductive biology, of cultural factors, etc. Between yam seed systems in Benin and the rice seed systems in the Philippines, differences are huge, even though one can reasonably attempt to describe them with a single theoretical framework. It results from this diversity and complexity over space and time that ways to sustain, protect, and strengthen community based seed systems will have to be diverse, tailored and adaptive. In a sense, there is no ‘best way’ to protect and strengthen community based seed systems—there are ways which are appropriate or not depending on the situation.”

Community based seed systems are a reflection of the various roles food plays in our lives, beyond sustenance. They are linked to culinary traditions and the markets that sell local food; they are contextual and rooted in local relationships. Yet one of the most significant points made in Frison and Hodgkin’s report is that seed and agricultural biodiversity governance, local to international policies, and many international institutions, all work in the opposite direction, operating from the top down, dismissing and ignoring the people vital to community based seed systems.

“Effective local seed systems are the mechanisms for the access and exchange of materials needed by farmers,” write Frison and Hodgkin. They are “key to the maintenance of seed diversity” and they are already in place. Frison and Hodgkin cite a survey of numerous farmers in six countries that found that more than 50 per cent of their seed came from local markets, neighbours, friends or relatives. They estimate that 90 per cent of farmers get their seeds informally, and emphasize that *in situ*, on-farm seed saving strategies are essential complements to *ex situ* seed banking efforts.

Intrinsic to community based seed systems is saving seeds *in situ*, but compendium contributors diverge in their perspectives on how best to support and enhance these systems. For example, Jim Gaffney and Valasubramanian Ramaiah make the argument that “local sites are often inadequate and seed degrades over time due to exposure to the elements, disease and insect damage.” As a result, the saved seed from traditional varieties “may, over a few generations, no longer provide the same level of productivity or quality or are no longer genetically distinct.”

FROM OUR CONTRIBUTORS

RESTORING INDIGENOUS SEED FARMING IN NORTH AMERICA

Winona LaDuke, Honor the Earth

Across the United States and Canada, many tribal communities and Indigenous organizations have taken leadership in seed restoration and farming restoration. Some of this work is to defray the introduction of more GMO seeds, as this would have a detrimental impact on indigenous seed stock and diversity. Winona LaDuke describes the challenges facing these communities, including the appropriation of land, loss of Native farmers, lack of access to United States Department of Agriculture loans and programs, and the concentration of seed ownership. These challenges have contributed, over time, to a decline of food wealth. LaDuke emphasizes the connection between community based tribal agriculture and seed restoration programs, and the need for Indigenous-led agriculture research stations that promote and improve indigenous seed stock.

Gaffney and Ramaiah, as well as Cary Fowler, express another concern about *in situ* storage—that it does not promote enough genetic diversity for climate adaptation. Fowler suggests addressing this by creating packages of diverse seeds from different geographic regions “assembled and provided to farmers on a massive scale to promote adaptation” as a strategy for getting a greater number of varieties into the hands of farmers.

Bettina Haussmann suggests we move to a more systems-oriented approach to breeding, where the different functions of a crop or cultivar in the production system are considered and improved/optimized. She writes: “Such an approach actually includes a paradigm shift from promoting just a few ‘best-bet’ varieties to promotion of functional diversity via the development of a portfolio of “best-fit” varieties (varieties that are specifically adapted to different contexts, functions and needs). To enable this, a paradigm shift is needed from considering farmers just as ‘beneficiaries’ and passive ‘adopters’ to considering farmers as real partners who inform and advise the crop improvement process.”

Haussmann proposes to strengthen the partnership between farmers and the public and private sector seed improvement establishment. This could include the participatory development and evaluation trials of varieties that are adapted to the local context, training of farmer seed producers, and public-private-farmer partnerships that include farmers as partners and co-creators of new research and business models to enhance agricultural biodiversity.

Pat Mooney with the ETC Group states that, “It is now abundantly clear that farmers play a vital role in both conserving traditional plant varieties and also in crossing traditional varieties with varieties bred by public and private institutions to improve and develop entirely new varieties. The important distinction

“It is now abundantly clear that farmers play a vital role in both conserving traditional plant varieties and also in crossing traditional varieties with varieties bred by public and private institutions to improve and develop entirely new varieties. The important distinction is that farmers not only preserve, but they also develop. Indeed, preservation is far from a curator function—it is part of a practical strategy to maintain diversity for future needs.”

is that farmers not only preserve, but they also develop. Indeed, preservation is far from a curator function—it is part of a practical strategy to maintain diversity for future needs.”

The compendium contributors clearly communicate the relevance of agricultural biodiversity for sustainable food systems and the future of food on our planet. The contributors stressed the importance of agricultural biodiversity, the central role of women and Indigenous Peoples in maintaining and enhancing agricultural biodiversity, and the extraordinary value of seeds for family nutrition, resilience to climatic changes, and local economic development. The importance of farmer managed and community based seed systems was emphasized repeatedly, as was the need for new partnership models that bridge traditional divides between diverse geographical contexts, and formal and informal, private and public sector approaches to agricultural biodiversity conservation. This provides a backdrop for the broad range of recommendations and solutions proposed in the compendium.



PROPOSALS FOR THE FUTURE OF SEEDS: ADVOCATING FOR SOLUTIONS

“The legal implications of laws and policies eroding or protecting seed ownership for farmers are significant, and farmers and their organizations and allies need to be a part of these decision making processes.”

Within the context of both shared and divergent views on the relevance of seeds and principal themes, the contributors to the compendium offered recommendations and proposals to strengthen agricultural biodiversity. These have been distilled and only a few of the many specific and contextual recommendations are offered in this synthesis as there were too many to list individually. For the complete list please refer to the full compendium.

PROPOSAL 1: DEVELOP A COORDINATED ADVOCACY STRATEGY IN SUPPORT OF COMMUNITY BASED SEED SYSTEMS

Many contributors expressed concern that current seed laws and policies are undermining farmer managed and community based seed systems, and that effective and coordinated advocacy and investment in support of agricultural biodiversity and community based seed systems is required now more than ever. This advocacy ranges from defending local seed systems to ensuring that small-scale farmers have a stronger voice in international decision making fora. The legal implications of laws and policies eroding or protecting seed ownership for farmers are significant, and farmers and their organizations and allies need to be a part of these decision making processes. For example, Pat Mooney proposes to create an independent Civil Society Mechanism (CSM) for the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) using the model currently in place for the Committee on World Food Security (CFS). Full participation of farmer and civil society organizations at these meetings would ensure seed and agroecology issues are addressed, and could impact a wide range of seed policies at both the international and national levels.

Many contributors articulated that international laws, policies and conventions should strengthen, and not undermine, farmer managed and community based seed systems. Organizations and social movements representing farmers, women, and Indigenous Peoples should have a seat at the tables where policies and laws on agricultural biodiversity and seed systems are negotiated and determined.

As well, developing a coordinated strategy could facilitate the participation of farmers, women, and Indigenous Peoples in policy negotiations, surface common challenges, priorities and creative solutions, as well as encourage the release of the funding and investment required to enhance community based seed systems. Donors can be central to the development of such a strategy and can lend their voice in support of community based seed systems at international and national meetings and gatherings.

**PROPOSAL 2:
PROVIDE GREATER RESOURCES AND SUPPORT
TO COMMUNITY BASED SEED SYSTEMS**

Many contributors underlined the importance of directing resources and support to community based seed systems. This could include training for farmers' organizations, support for participatory plant breeding programs, gene pool maintenance, and engaging farmers in research, monitoring and decision making. The objective would be to (1) enhance resilience and adaptability across seed systems, (2) foster creative connections between informal and formal systems, and (3) benefit from public and private sector approaches to agricultural biodiversity. The diversity within community based seed systems is a strength from which to understand and share approaches.

Central to this integrated knowledge-sharing and research platform could be a new partnership between farmers, and the public and private sectors, with the co-creation of new business and research models.

Farmer led and community based research, and research that promotes a partnership between farmers and scientists was emphasized. The African Centre for Biodiversity, Jim Gaffney and Valasubramanian Ramaiah, Nelson Mudzingwa, Mamadalieva et al, and Bettina Haussmann all proposed increasing knowledge-sharing between local farming communities and the public and private sectors in order to build an integrated platform to conserve agricultural biodiversity. Central to this integrated knowledge-sharing and research platform could be a new partnership between farmers, and the public and private sectors, with the co-creation of new business and research models. Government agencies could support local research and monitor agricultural biodiversity, as well as develop policies for the protection of community based seed networks.

Additionally, some contributors suggested that further understanding and monitoring of both global and national policy contexts would be helpful. The African Centre for Biodiversity, Maryam Rahmanian, Nelson Mudzingwa, Emigdio Ballon, Emile Frison, and Toby Hodgkin all state that seed legislation and intellectual property laws are national and must be monitored for the limits they impose—intentional or not—on farmers' ability to freely produce and exchange seed.

Contributors emphasized that donor agencies can play an important role in convening and strengthening networks of advocates and researchers related to farmer managed, community based seed systems. Donors can also work together to leverage funding for and investment in community based seed systems. In addition, donor agencies can support further research on community based seed systems, especially in relation to how these systems can be supported by international laws, policies, and conventions instead of being undermined—as is currently happening.

PROPOSAL 3:

STRENGTHEN THE CENTRAL ROLE WOMEN AND INDIGENOUS PEOPLES PLAY IN AGRICULTURAL BIODIVERSITY

Many contributors stress the importance of the participation of women and Indigenous Peoples in decision making at local, regional, national and international levels, and underline that both groups are often absent from decision-making processes.

Mamadalieva and co-authors propose to support these seed keepers by creating certificates for new varieties of seeds thus officially recognizing their role as custodians of agricultural biodiversity when selling or exchanging seeds at farmer's markets and within farmer seed networks. Winona LaDuke emphasizes the need to establish indigenous agricultural research stations so that Indigenous researchers can work on the adaptation of varieties and restoration of seed stock as well as train tribal leadership in community based seed systems.

To build capacity and support on a local level requires on-the-ground networks and knowledge sharing, starting with the participation of farmers. Supporting Indigenous Peoples and enhancing the role of women requires deliberate engagement and support of these constituencies, as well as targeted funding and investment to facilitate participation.

CONCLUSION

As seen in this overview of the recommendations that emerge from the compendium, strengthening agricultural biodiversity requires action at the local, regional, national and international levels. The urgency is clear. Agricultural biodiversity is central to the future of food and our planet. The diverse contributors to this compendium stress the importance of bolstering community based seed systems, and propose that donors, governments, researchers, and civil society organizations align their priorities with this goal. With the publication of this compendium, the Global Alliance for the Future of Food is emphasizing the importance of agricultural biodiversity to sustainable food systems. We encourage you to read all of the contributions. This is just the beginning of a longer term exploration of these critical issues, and we hope to engage many more perspectives and opinions in a conversation about the complexity of community based seed systems, how they fit within the broader landscape of food systems, and how to better support them and their potential to shift towards a future of food that is more sustainable, equitable and secure.



CONTRIBUTORS

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EMILE FRISON is an internationally known agricultural researcher and Professor of Agricultural Sciences at the Université catholique de Louvain, Belgium. Frison has authored or co-authored over 175 scientific, technical and policy papers. He is the former Director-General of Bioversity International, part of the CGIAR Consortium, and during his tenure developed a strategy entitled “Diversity for Well-being,” which focuses on the contribution that agricultural biodiversity makes to the sustainability, resilience and productivity of smallholder agriculture and to the nutritional quality of diets. He is a member of the International Panel of Experts on Sustainable Food Systems (IPES-Food) and a member of the executive board of the Global Crop Diversity Trust.

TOBY HODGKIN was trained as a geneticist and plant breeder, and joined the International Board for Plant Genetic Resources (now Bioversity International) in 1989 to support its work on the maintenance and use of crop genetic diversity. Hodgkin was closely involved in developing Bioversity International’s on-farm conservation program and in the development of the organization’s work on the socio-economic aspects of the maintenance of genetic diversity and on forest genetic resources. He has published extensively on many aspects of the conservation and use of plant genetic resources, is a past director of the Global Partnerships Programme of Bioversity International and is currently Coordinator of the Platform for Agrobiodiversity Research.

AUTHORS OF COMMENTARIES

THE AFRICAN CENTRE FOR BIODIVERSITY is an NGO based in South Africa that carries out research, analysis, advocacy, and information-sharing which informs and amplifies the voices of social movements fighting for food justice and food sovereignty throughout Africa.

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CARY FOWLER is the former executive director of the Global Crop Diversity Trust, and the Chair of the International Advisory Council of the Svalbard Global Seed Vault. Originally from rural Tennessee, Fowler has been a professor at the Norwegian University of Life Sciences, a senior advisor to the Director-General of Bioversity International and a representative of the CGIAR Consortium in the negotiations of the International Treaty on Plant Genetic Resources for Food and Agriculture. He is currently a visiting scholar at Stanford University.

JIM GAFFNEY started with DuPont Pioneer in 2010 and in his role works on advancing agronomic traits, including those that help crops better use water and improve yield and yield stability. Gaffney earned a Bachelor’s degree from the University of Minnesota, a Master’s from South Dakota State University and a PhD from the University of Florida. He is particularly

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MUHABBAT MAMADALIEVA is one of the first women in Tajikistan to have earned a PhD in Plant Genetics. In 1999, together with other professional women, she founded *Zan Va Zamin* (Women and Earth), an NGO dedicated to tackling issues facing rural women, including land rights, livelihoods, and environmental degradation. Under Mamadalieva’s leadership, the organization won the Equator Prize in 2012 for showing leadership in promoting innovative ways to build resilient communities.

PAT MOONEY is the founder of RAFI (Rural Advancement Fund International)—later renamed ETC Group—and has decades of experience supporting civil society advocacy around development and trade issues. Much of Mooney’s work has centred on promoting agricultural biodiversity, with a more recent focus on the regulation of biotechnology. He is the author of several books on these issues, and is a recipient of the Right Livelihood Award (also known as the “Alternative Nobel Prize”).

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HUMBERTO RÍOS LABRADA is the Latin America Program Director for ICRA, an agricultural research institute based in Spain. After earning a PhD in Agronomy in his native Cuba, he worked for over a decade at the National Institute for Agricultural Sciences, where he developed an innovative methodology for farmers to teach scientists how to increase crop diversity. He has applied these methods in various regions of Mexico and Bolivia. In 2010, he won the prestigious Goldman Environmental Prize for his successful efforts to improve agrobiodiversity.

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