



INITIATIVE ON
Nature-Positive
Solutions

CGIAR Initiative on Nature-Positive Solutions

CIMMYT final report

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Summary

The Nature+ initiative was launched in 2022 as part of the OneCGIAR strategy to develop and implement solutions that support local food systems and livelihoods equitably while ensuring that agriculture contributes positively to the planet's ecosystems. CIMMYT participated in this initiative with a focus on Colombia and Burkina Faso through the "Conserve," "Manage," and "Recycle" work packages. Activities implemented included different diagnostics in the targeted countries (farmers typologies, stakeholders mapping, social network mapping of informal seed systems) in these regions through a nature-positive approach to understand the local contexts. Additional activities included co-designing solutions to address challenges identified by farmers and providing training on agrobiodiversity management.

Overall, the CIMMYT team engaged with thousands of farmers and 36 different stakeholders (34 in Colombia and 2 in Burkina Faso) through 72 events, meetings, workshops and training. Throughout the initiative, farmers received training in improved seed postharvest practices, ensuring the preservation of native maize and other crops. A total of 782 farmers (58% of women) participated in seed storage training. In addition, 11 community seed banks in Colombia were also strengthened with different equipment (moisture meters, dryers, sieves, airtight containers), providing local farmers with tools and knowledge to preserve agrobiodiversity. Smallholders' access to niche markets was part of the activities implemented, with workshops and matchmaking events to help bridge the gap between farmers and buyers and address challenges such as inconsistent supply, postharvest losses, and intermediaries dependence. The project also fostered collaboration with government institutions, including the Colombian Ministry of Agriculture, to create favorable policies for the promotion of bioinputs and sustainable farming practices.

Within the Multifunctional Landscape Science Program, CIMMYT, in collaboration with the other centers, will focus on expanding these efforts, with an emphasis on participatory varietal selection, business models to connect farmers with market opportunities, and women empowerment for biodiversity conservation. Efforts toward strengthening the seed systems for landraces will also continue, promoting biodiversity conservation and agroecological pest management practices. The collaboration with governmental institutions will continue to help co-design policies that support the production of bioinputs and biofactories and their accessibility to smallholder farmers, helping to create more sustainable farming systems across Colombia and Burkina Faso.

Keywords: Nature +; biodiversity conservation; agrifood system; sustainability; training and co-design

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Knowledge products

Research papers

- Goulet, F., Fonteyne, S., Lopez Ridaura, S., Niederle, P., Odjo, S., Schneider, S., Verhulst, N., & Van Loon, J. (2024). The emergence of microbiological inputs and the challenging laboratorisation of agriculture: Lessons from Brazil and Mexico. *Agriculture and Human Values*. <https://doi.org/10.1007/s10460-024-10614-y>
- Odjo, S., González Regalado, J., Saldivia Tejeda, A., Guera, M., & Verhulst, N. (2025). Hermetic bags remain effective in minimizing storage loss after four successive cycles of reuse in Mexican highlands. *Journal of Stored Products Research*, 110, 102480. <https://doi.org/10.1016/j.jspr.2024.102480>

Policy brief

- Goulet, F., Guerrero Poveda, D., & Odjo, S. (2024). Biofactories: New models for production and access to agricultural inputs in Latin America. *Perspective*, 64, 1–4. <https://doi.org/10.19182/perspective/37599>

Research briefs

- González Regalado, J., Romero, N., Bolaños, J., & Odjo, S. (2023). Mapeo exploratorio de la red de actores trabajando en “soluciones positivas para la naturaleza” a nivel local en las regiones andinas y caribe de Colombia. CGIAR. <https://hdl.handle.net/10568/139446>
- González Regalado, J., Vásquez Gamboa, G., García Frausto, I., Romero, N., & Odjo, S. (2024). Perspectiva de los agricultores sobre una finca basada en soluciones positivas para la naturaleza en el Valle del Cauca, Colombia. CGIAR. <https://hdl.handle.net/10883/34980>
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Blog posts

- Preservation of agrobiodiversity in Colombia: CGIAR’s Nature-Positive Solutions Initiative trains smallholder farmers in the conservation of Colombian native maize seeds <https://www.cgiar.org/news-events/news/preservation-of-agrobiodiversity-in-colombia-cgiars-nature-positive-solutions-initiative-trains-smallholder-farmers-in-the-conservation-of-colombian-native-maize-seeds/>
- Conservación, manejo de los recursos naturales y economía circular para la producción de maíz en Colombia <https://www.cimmyt.org/es/blogs/conservacion-manejo-de-los-recursos-naturales-y-economia-circular-para-la-produccion-de-maiz-en-colombia/>
- Infancias, maíces nativos y perspectiva de género <https://www.cimmyt.org/es/noticias/infancias-maices-nativos-y-perspectiva-de-genero/>
- Helping Colombia’s smallholder farmers to leverage and preserve maize diversity <https://www.cimmyt.org/blogs/helping-colombias-smallholder-farmers-to-leverage-and-preserve-maize-diversity/>
- Conversatorios para la preservación del maíz nativo colombiano <https://www.cimmyt.org/es/noticias/semillas-de-maiz-nativo-patrimonio-cultural-colombiano/>

- Continúan las labores de preservación de la biodiversidad del maíz en Colombia
<https://www.cimmyt.org/es/noticias/continuan-las-labores-de-preservacion-de-la-biodiversidad-del-maiz-en-colombia/>
- Acciones para preservar la biodiversidad del maíz en Colombia
<https://www.cimmyt.org/es/noticias/buscan-soluciones-para-preservar-la-biodiversidad-del-maiz-en-colombia/>
- Cadenas de valor y biodiversidad: descubriendo el potencial del maíz colombiano
<https://www.cimmyt.org/es/noticias/descubriendo-el-potencial-del-maiz-colombiano/>
- Del CAMPO al Campus: innovación y colaboración para el campo colombiano
<https://www.cimmyt.org/es/noticias/del-campo-al-campus-innovacion-y-colaboracion-para-el-campo-colombiano/>

1. Introduction

The global agrifood system is facing important challenges driven by industrial agriculture, which has significantly impacted both the environment and human well-being. The standardization of food sources and diets has adversely affected nutrition, farming incomes, and crop resilience to pests and diseases, weakening smallholder farming systems. These interconnected challenges are further intensified by misaligned public policies and economic incentives. There is an urgent need to transform the agrifood system into a more sustainable and resilient one to mitigate the contribution of agriculture to deforestation, greenhouse gas emissions, and water overuse while enhancing and favoring soil health and biodiversity conservation. Nature-positive food systems are characterized by a regenerative, non-depleting and non-destructive use of natural resources. The 2021 UN Food Systems Summit formally recognized nature-positive production as one of five critical pathways to sustainable food systems.

The Nature+ initiative was established within the OneCGIAR strategy in 2022 to reimagine, co-create and implement solutions that equitably support local food systems and livelihoods while positioning agriculture as a net positive contributor to the planet's ecosystems. The objective was to co-assess, co-design and co-implement with international, national, regional and local stakeholders nature-positive solutions that increase productivity along with no biodiversity loss, no deforestation, no land degradation, a minimal carbon and water footprint, better water and nutrient management and enhanced equity outcomes. The initiative was articulated in 5 work packages: (1) **Conserve**, focusing on developing solutions for the conservation of agrobiodiversity, water and soil; (2) **Manage** biodiversity and natural resources by improving production systems and introducing innovations in biodiversity, water, and soil management; (3) **Restore** degraded community lands through cost-efficient nature-positive solutions; (4) **Recycle** rural waste management through a circular economy approach and empowering SMEs to turn waste into valuable resources; and (5) **Engage** key actors to foster an enabling environment which favors the promotion of nature-positive solutions.

CIMMYT took part in the initiative and mainly worked in Colombia and Burkina Faso through the work packages Conserve, Manage and Recycle. Activities performed relied on different diagnostics of the agrifood systems at the different sites of the initiative following a nature-positive perspective, a co-design of solutions to solve challenges identified by farmers and capacity building on the management of agro-biodiversity. The current report highlighted the main results achieved during the implementation phase of the initiative in collaboration with the other participating CGIAR centers.

2. Diagnostic

2.1. Diagnostic of the agrifood system in Nariño¹

Secondary data from the National Agriculture Survey of Colombia (ENA in Spanish) were used to build Agriculture Productive Unit's typologies with the objective of identifying general patterns in each region, providing a perspective on farm composition in each region and discussing alternatives to enhance resilience and food security. A Principal Component Analysis through Hierarchical Clustering (PCA) was performed using data from ENA and was validated with qualitative discussion with farmers and other stakeholders during field visits. Four types of farms were identified in Nariño, including (1) dairy farms with grasslands, (2) mixed-farm systems, (3) commercial farms, and (4) coffee-fruit smallholders. All these farms have different interests, face different challenges and present different opportunities for innovation (Table 1). Overall, this study confirmed that diversification will be key to improving the resilience of farmers in Nariño. Innovations in this context need to be tailored to individual farm types and scaled effectively, supporting food security and preserving cultural tradition but also emphasizing farmers' mid- to long-term objectives and strategies. Gardens, for instance, play a vital role in providing year-round food security during shocks, while crop diversification—particularly for cash and staple crops—helps sustain culinary traditions and environmental health. Collaboration among farmers, researchers, policymakers, and consumers is essential to redesign farm systems that are both efficient and resilient. Innovations must respect the unique logic of each farm and its constraints to ensure their success without causing harm. While this study provides a broad overview, deeper research into specific farm-system dynamics is necessary to refine these approaches further.

¹ Manuscript in preparation

Table 1. Farm typologies, potential innovation, opportunities, risks and limitations

Farm typology	Type of innovation	Opportunities	Risks	Limitations
Dairy farms with grassland (T1)	<ul style="list-style-type: none"> • Double-purpose maize or enriched fodder crops as Leguminosae's • Graze rotation to improve soil and herd meat quality • Weeding machinery and organic fertilization of graze¹ 	<ul style="list-style-type: none"> • Artificial insemination to improve animal genetics • Nutritive fodder can push up the milk yield to be more profitable and intensive¹ 	<ul style="list-style-type: none"> • The grassland is related to other crops, such as potatoes (high zone) or green peas, that need heavy chemical fertilization to achieve purchasers' contracts. • The high demand for grass as fodder implies a high risk on the value chain for milk and final prices for consumers 	<ul style="list-style-type: none"> • Market can influence decision-making and internal processes
Mixed farm systems (T2)	<ul style="list-style-type: none"> • Diversification/conservation of genetic materials • Postharvest practices • Agroecological practices for pest management • Mixed Farm System innovations to include forestry management • Reduce family labor through mechanization (women, children and elders)³ 	<ul style="list-style-type: none"> • Achieve major resilience/food security through diversified gardens • The expertise in local species and their services to human and natural welfare 	<ul style="list-style-type: none"> • Diversity loss • Expensive reconversion on the surface and the conflict with peasant view of a more profitable agriculture 	<ul style="list-style-type: none"> • Resources important limitations, cultural awareness and traditional management of chagras
Commercial farm-systems (T3)	<ul style="list-style-type: none"> • Efficient use of fertilizers or pesticides². • New high yield varieties of green pea², potato and maize. • Recuperation of local varieties of wheat and barley. 	<ul style="list-style-type: none"> • Maize is an important input for food and local markets • Cash crops can mitigate the effect of international markets for other products • Maize is seen as a land-recuperation crop after heavy chemical application 	<ul style="list-style-type: none"> • Maize/wheat/barley imported price and national policies for trade made the crops less profitable, leading to biodiversity loss 	<ul style="list-style-type: none"> • Maize is a secondary crop with low-value • The behavior of farmers is recognized as cash crop maximizers, following market quickly conversion
Coffee-fruit smallholders (T4)	<ul style="list-style-type: none"> • Agroforestry techniques to enhance organic production • Diversification of associated crops as a secondary income or food security strategy in desertification zones • Avocado and cacao are high-value crops, with potential in tropical zones⁴ 	<ul style="list-style-type: none"> • Learn the coffee experience to lead other crops to high-value markets through the organization for marketing and transformation to gain value 	<ul style="list-style-type: none"> • Coffee needs to achieve very specific contracts to be profitable, and all innovations need to contribute to the main cash crop to be relevant for farmers • Plantations are established as mono-crops with a high use of chemical inputs 	<ul style="list-style-type: none"> • As coffee is the main cash crop, any possible change could be seen as a treat for family well-being.

2.2. Diagnostic of the local seed system of native maize in Colombia²

Gender-differentiated focus groups were made in the departments of Valle de Cauca (Tuluá) and Nariño (Cumbal, Cordoba), Colombia, to understand their perspective on the conservation of maize diversity in the community, analyze conservation trends over time and understand the reasons for the abandonment of some landraces. In general, maize landrace seed networks are composed of a few actors, including farmers and farmers groups. These actors generally collaborate through seed exchange, farmers' meetings and training on various topics of agriculture and seed conservation. Farmers highlighted many challenges related to the conservation of native maize varieties, including challenges in having access to seeds, climate change impact, and postharvest challenges, which overall led to the loss of some of the landraces. This diagnostic provides critical information that will help design research and development strategies to support the in-situ conservation of native maize.



Figure 1. Mapping maize local seed system network in Tuluá, Valle del Cauca Colombia by men (left) and women (right)

2.3. Diagnostic of the seed system of millets in Burkina³

In Burkina Faso, where agriculture is essentially subsistence and rain-fed, millet is one of the most important crops and is grown mainly in the semi-arid Sahelian and Sudano-Sahelian zones. As a drought-resistant cereal, millet plays an essential role in food security, particularly in the face of changing climatic conditions. Millet also contributes to cultural and traditional diversity, making it a cornerstone of local diets and traditional practices.

² Manuscript in preparation

³ Ongoing data analysis

However, millet production in Burkina Faso faces significant challenges leading to low productivity caused by biotic and abiotic stress due to *Striga hermontica*, drought, low soil fertility, irregular rainfall distribution, limited access to inputs, including high-yielding varieties. A survey followed by different focus groups were performed in 8 regions in Burkina Faso to document farmers' practices contributing to the conservation of millet landraces, millet seed systems and millet seed networks in Burkina Faso. As a general observation, improved millet varieties have been developed but are not sufficiently adopted by farmers for many reasons, including the fact that these varieties do not sufficiently meet farmers' preferences. In addition, many millet landraces were abandoned due to their long cycles and are not accessible anymore, highlighting the need for participatory varietal selection and implementation of community seed banks. The data will be analyzed in 2025 to derive recommendations for future interventions.



Figure 2. Focus group results on millet conservation in Burkina Faso

2.4. Mapping of stakeholders farmers involved in the promotion of nature-positive solutions⁴

Preserving Colombia's biodiversity while ensuring sufficient food production for the population is a key sustainable development goal that has been actively supported in recent years by governments and both public and private institutions. However, the lack of information and communication among stakeholders could create asymmetries and limit the innovation process. A study using a social network method was implemented in Colombia to map actors working with innovations related to landrace conservation and nature-positive agronomic solutions. A total of 131 actors were identified and interviewed in several departments in the Andean and Caribbean regions of Colombia. The main actors in the network were identified as teaching and research institutions, farmers' organizations, individual farmers and government institutions. The main collaborative activities mentioned were technical assistance, production, education and research. This network of actors can be characterized as young, with few connections between actors, which hinders the flow of information on innovations. There is a need to develop more actions that favor linkages between actors for the sustainable implementation of nature-positive solutions in Colombia.

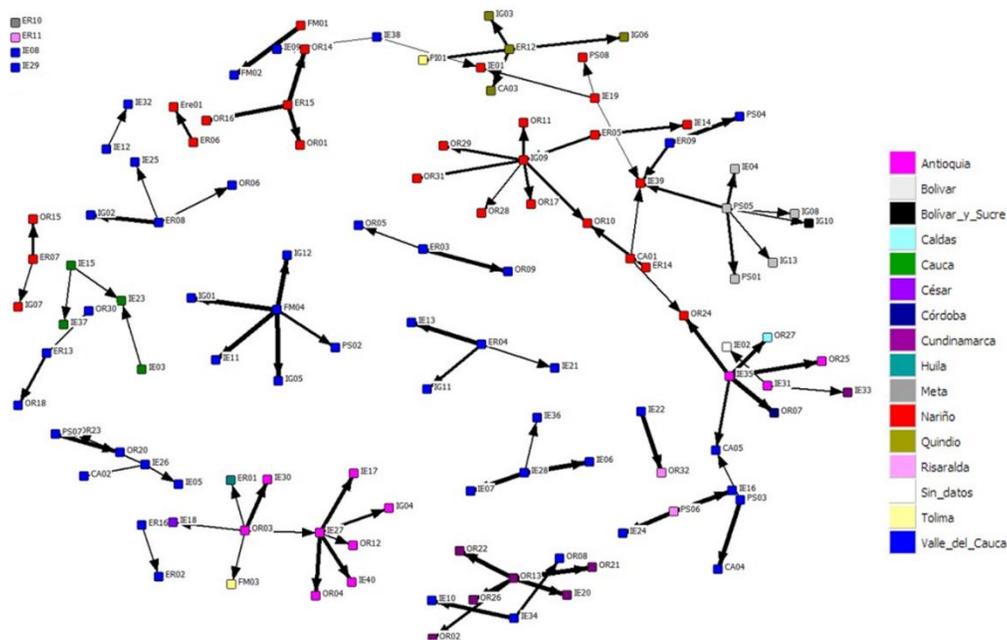


Figure 3. Network of actors working on nature-positive solutions in Colombia and their strength of ties (the thickness of the line indicates more years of collaboration) in 2023.

⁴ This work was published as a research brief: Mapeo exploratorio de la red de actores trabajando en “soluciones positivas para la naturaleza” a nivel local en las regiones andinas y caribe de Colombia; <https://cgspace.cgiar.org/items/5796712e-b293-4474-9711-1ce579218c6f>

2.5. Smallholder farmers' perspective on nature-positive solutions-based farms in Valle de Cauca, Colombia⁵

The perspective of smallholder farmers on nature-positive solutions-based farms was studied to co-create knowledge and bridge the gap between this approach and the farmers' point of view. Semi-structured interviews were conducted in Valle de Cauca with 75 smallholder farmers and a gender-differentiated frequency analysis was carried out with the information collected. From a food production approach based on nature-positive solutions, farmers in Valle del Cauca prioritized the conservation of natural resources. They favored the implementation of soil, water and forest conservation practices (36%) over sustainable agricultural practices such as crop diversification (11.9%), organic fertilizers (10.4%), cover crop management (7.4%) and agroecological practices (4.4%). They considered that farming while caring for nature would have an impact on sustainability based on food security by benefiting their families and the community. Obstacles identified by farmers to move to nature-positive farms include lack of knowledge and training, low economic resources, and poor agrochemical management. Farmers agreed that governments and institutions can support training, production subsidies and marketing for the implementation of nature-positive farms.

2.6. Women's roles in crop pest and disease management: a literature review⁶

To maintain and increase productivity, profitability and resilience of agrifood systems, it is important to have efficient pest and disease control management. This problem continues to affect many rural communities, especially small-scale ones, causing negative effects on the food security of producers. Therefore, it is important to develop and scale up sustainable and gender-sensitive integrated pest and disease control technologies and practices. Women are involved in the control of crop pests and diseases and play key roles in different agricultural activities. However, their participation is underestimated due to social and cultural norms, institutional barriers and inaccurate measurements that exacerbate gender gaps between men and women by restricting access to resources and assets that would increase yields in agricultural production. A literature review was performed to synthesize findings from articles and grey literature that address the existing evidence on women's participation in pest and disease control and management in agricultural production. Specifically, it identifies gender roles and differences in pest and disease control, points out

⁵ This study was published a research brief: erspectiva de los agricultores sobre una finca basada en soluciones positivas para la naturaleza en el Valle del Cauca, Colombia. <https://hdl.handle.net/10883/34980>

⁶ The literature will be published as a working paper and a manuscript on women interest in pest management technologies is in preparation.

technological preferences for this task, the underlying reasons for them and the obstacles they face. It is concluded that it is possible that the distinctions between men's and women's preferences are not explained in terms of preferences but in terms of limitations in the latter's ability to choose.

3. Co-creation

3.1. Women empowerment for the preservation of maize landraces in Colombia⁷

In Colombia, sustainable agriculture initiatives have increasingly focused on empowering women to contribute to biodiversity conservation by addressing barriers to their participation. Traditional gender roles in rural communities often limit women's participation in agricultural training and decision-making, as they must balance household responsibilities, including childcare. Recognizing this challenge, CIMMYT and its partners implemented innovative solutions, such as offering childcare during participatory workshops. In Nariño and Valle del Cauca, where family farming systems are prevalent, providing safe spaces for children during the events has allowed women to participate in the activities fully. These workshops not only teach sustainable agricultural practices but also allow women to share their perspectives on the conservation of native maize varieties. For example, while mothers participate in discussions and training, children participate in educational games and art activities, promoting biodiversity awareness from an early age.

This inclusive approach has created a supportive environment for women to strengthen their knowledge and leadership in agricultural conservation. Women have expressed that childcare support allows them to focus on learning, apply new practices at home, and influence household decisions. In addition, these efforts contribute to generational continuity by involving children and youth in conservation initiatives, such as through youth groups like Herederos del Planeta Los Tucanes, which advocate for nature reserves and the care of native seeds. By addressing women's dual roles in agriculture and domestic work, these strategies empower them to play a vital role in preserving agrobiodiversity. Their active participation enhances the sustainability of agricultural systems, safeguards native seeds crucial to food security, and helps communities adapt to climate change. This holistic approach highlights the importance of gender-sensitive agricultural policies to promote biodiversity conservation while supporting rural women's leadership and socioeconomic advancement.

⁷ A manuscript reporting on women roles in biodiversity conservation is in preparation; part of this story is also reported as a blog post: Infancias, maíces nativos y perspectiva de género <https://www.cimmyt.org/es/noticias/infancias-maices-nativos-y-perspectiva-de-genero/>



Figure 4. A woman farmer in Nariño, Colombia, in a diversified chagra with native crops of maize, potato, oca, squash, and beans, among other perennial and wild crops for harvesting (on the left); Group of women farmers discussing the role of women and men in the conservation of native maize in Córdoba, Nariño, Colombia.

3.2. Preserving maize landraces in Colombia: stakeholders conservatories to connect landraces farmers to market niches⁸

Efforts to preserve maize landraces in Colombia face challenges such as climate change, socioeconomic pressures and smallholder migration. These varieties, grown on small plots primarily for home consumption, exchange and limited sale, embody a unique genetic and cultural value. Different workshops and focus groups were implemented to strengthen the native maize value chain in Nariño, Cundinamarca, Boyacá, Valle del Cauca and Putumayo, fostering linkages between farmers and markets and promoting conservation. This initiative included documenting maize conservation, marketing and consumption practices to design strategies that benefit rural farmers and their communities. Maize varieties such as Capia, Morocho, Granizo and Chulpe are sold in Colombian markets, and niche markets show growth potential, particularly for purple or colored maize. Potential markets include fair trade companies, restaurants offering traditional and experimental dishes and small-scale intermediaries. However, farmers face high production costs, the effects of climate change and dependence on middlemen, while buyers face inconsistent supply, storage constraints and postharvest losses. Despite the challenges, smallholder farmers express a strong commitment to preserving the diversity and cultural heritage of maize. Farmers stress the importance of growing maize not only for profit but for its role in agrobiodiversity and food sovereignty. To bridge the gaps, different focus groups with farmers and buyer-seller

⁸ These stories were reported in different blog posts: <https://www.cimmyt.org/blogs/helping-colombias-smallholder-farmers-to-leverage-and-preserve-maize-diversity/>; <https://www.cimmyt.org/es/noticias/semillas-de-maiz-nativo-patrimonio-cultural-colombiano/>

matchmaking events were implemented to address market inefficiencies, enhance fair trade opportunities, and promote a sustainable future for native maize in Colombia.

Farmers, marketers, chefs, processors, intermediaries and other key actors -leaders of farmers' organizations, agencies such as the Servicio Nacional de Aprendizaje (SENA), the Corporación Autónoma Regional del Valle del Cauca (CVC), la Pastoral Social, among other organizations- participated in the discussions. A total of 71 people (including 45% of women) were engaged during these workshops and discussed the influence of markets on conservation, the benefits of maintaining the diversity of local varieties, the problems (and possible solutions) faced by each link in the value chain, as well as the opportunities related to market demands, such as constant supply, the supply of colored varieties and the good quality of the grains. These participatory processes allowed the different actors in the value chain to visualize the power of niche markets and other forms of commercialization - marketplaces, granaries, small informal stores selling traditional products, and seed sales- to influence the conservation and rescue of traditional crops.



Figure 5. Women farmers and buyers at a workshop on maize landraces value chain in Pasto, Colombia

3.3. Collaboration with the Colombian Ministry of Agriculture and Rural Development to analyze public policies which facilitate smallholder farmers' access to bioinputs⁹

In the context of Colombian agriculture, the growing importance of bioinputs has captured the attention of various actors, from government entities to productive sectors. The resolution 06830 of 2020, issued by the Instituto Colombiano Agropecuario (ICA), establishes bioinput as a product used for integrated pest management purposes or to improve crop and soil productivity, massively elaborated from live microorganisms, viruses, macroorganisms, naturally occurring products or biochemical products. A diagnostic of the ecosystem that develops around bioinputs in Colombia was carried out, focusing on three essential aspects: the actors involved in the production, distribution and use of bioinputs, in addition to those related to scientific and research development; the policies and regulations that influence their adoption and development; and the government institutions and civil society organizations that play a key role in the promotion and supervision of these emerging agricultural technologies.

On the other hand, in collaboration with the Ministry of Agriculture and Rural Development (MADR), a strategic partnership was established to strengthen the production and scope of bioinputs in the country with a particular focus on the establishment of biofactories. As local infrastructures that allows the decentralized production of agricultural inputs, they are a key component of the bioeconomy, contribute to the reduction of dependence on chemical inputs and the promotion of more sustainable agricultural practices that are adapted to the farmers' context. The objectives of this collaboration involved identifying opportunities for intervention and improvement for the different types of existing biofactories and characterized in the country, considering their dynamics and knowing the processes developed in each one of them, providing an external point of view to those contemplated by the MADR. Strengthening the emergence of biofactories as centers for the production of bioinputs at the local level was part of the strategy promoting self-sufficiency and reducing dependence on imported chemical inputs through a dialogue with the MADR that would show how these processes have been developed in other countries and complement the guidelines and goals proposed by the MADR. Another objective of this collaboration is to contribute hand in hand with the MADR to the establishment of mechanisms and guidelines that facilitate the dissemination and implementation of strategies for the promotion of a bioeconomy in Colombia. The first part of this work focused on documenting the implementation of biofactories in Colombia. Collaboration will continue in the coming years to achieve the established objectives.

⁹ Part of this story was published in a policy brief: Biofactories: A new model for production and access to agricultural inputs in Latin America <https://cgspace.cgiar.org/items/033b5e49-77be-4cc0-a6d9-adbcd97014c5>

4. Capacity sharing

4.1. Capacity building of farmers on postharvest practices for the preservation of landraces¹⁰

The preservation of native maize and other grains is endangered by several challenges, including poor postharvest practices that fail to maintain the quality of the seeds after harvest. During the postharvest period, the main problems include birds predation (such as parrots in the field), rodents and insects infestation-especially weevils and moths-. Postharvest loss of maize and bean grains and seeds are high, estimated at 15-100%. Maize seeds are generally preserved by leaving the cobs with their husks for protection against insects and hanging them on the roofs of houses, often near kitchen. During visits to farmers' farms and community native seed banks, several problems were identified, such as inadequate humidity (>13%), insect and fungal damage, and, in general, poor storage conditions that do not allow seed quality to be maintained.

To strengthen the grain and native seed conservation system, training workshops and evaluations on postharvest handling for proper storage were conducted. The training focused on good postharvest practices for seeds preservation, including optimal harvest timing, drying, shelling and cleaning, checking of grain moisture using simple methods such as the sun and salt method, and hermetic storage. Training workshops were held in the municipalities of Tuluá, Restrepo, Sevilla, El Dovio and Bolívar. In Cesar, we collaborated with organizations in Valledupar and Pueblo Bello, while in Nariño, workshops were held in Ipiales, and Putumayo, in Sibundoy.

In 2023, 314 farmers participated in these workshops, with slightly more than half (50.6%) being women. In 2024, a total of 468 producers, including 271 women (58%), were trained in good postharvest practices for storing maize and other grain seeds.

¹⁰ Part of these activities was published in a blog post: Preservation of agrobiodiversity in Colombia: CGIAR's Nature-Positive Solutions Initiative trains smallholder farmers in the conservation of Colombian native maize seeds <https://www.cgiar.org/news-events/news/preservation-of-agrobiodiversity-in-colombia-cgiars-nature-positive-solutions-initiative-trains-smallholder-farmers-in-the-conservation-of-colombian-native-maize-seeds/>

4.2. Strengthening the capacity of community seed banks in Colombia¹¹

Community seed banks play a significant role in rural communities by preserving the genetic diversity of indigenous crops, ensuring food security and safeguarding traditional agricultural knowledge. They provide farmers with access to locally adapted seeds, which are essential to address climate change and environmental challenges. These banks foster collaboration and knowledge sharing among community members, empowering them to conserve their cultural heritage while improving agricultural sustainability.

As part of this strategy in Colombia, 11 community seed banks were supported during the implementation phase of the initiative. A major highlight was the provision of equipment to improve seed conservation, including moisture meters, sieves, glass and plastic containers, and airtight storage units. These devices will help farmers enhance seed preservation, ensuring the long-term viability of native maize varieties.

In addition, training on the use of these tools and seed preservation was provided to the community seed bank members. Discussions and practical demonstrations on moisture determination methods, including traditional techniques like using salt alongside electronic tools, allowed participants to evaluate their effectiveness and adapt best practices for their needs. Participants emphasized the importance of seed banks as centers for knowledge-sharing and conservation. They envision these banks as “open schools” where women, men, and children can learn to preserve seeds in the land and collective memory. This approach strengthens intergenerational knowledge and biodiversity conservation.

5. Synergies with other participating centers

5.1. Establishment of the Cumbe Community Seed Bank, Nariño¹²

In Nariño, farmers face critical challenges in seed and food security due to declining crop diversity and limited seed exchange. In response, the Alliance of Bioversity and CIAT and CIMMYT, through the CGIAR Initiative on Nature-Positive Solutions, supported the establishment of a new community seed bank, *Yel-Pue Cumbe*, in Cumbal, Nariño. This initiative aims to conserve local seeds, enrich agrobiodiversity, and promote knowledge-sharing among farmers while fostering Indigenous culture and education. The seed bank

¹¹ Part of this activity was published in a blog post: Continúan las labores de preservación de la biodiversidad del maíz en Colombia <https://www.cimmyt.org/es/noticias/continuan-las-labores-de-preservacion-de-la-biodiversidad-del-maiz-en-colombia/>

¹² This activity was reported in a blog post: A new Indigenous community seed bank for everyone in Cumbal, Colombia <https://alliancebioiversityciat.org/stories/new-indigenous-community-seedbank-everyone-cumbal-colombia>

was inaugurated in November 2024 and hosted by the Institución Educativa Técnica Agropecuaria Indígena Cumbe in Cumbal and followed participatory seed flow analyses and feasibility exercises, where farmers evaluated key indicators such as motivation, leadership, and potential benefits. The community seed bank was established to serve as a hub for the nine sub-districts of Cumbal. The seed bank will also function as an educational tool, engaging students and staff in its daily management. At the inauguration, farmers deposited seeds from diverse crops, including barley, maize, and quinoa. The seed bank's core functions include conserving local crops and knowledge, raising awareness of crop diversity, increasing the diversity of cultivated crops, and facilitating seed exchange.

5.2. Conservation, natural resource management and circular economy for maize production in El Dovio, Valle de Cauca¹³

The participatory diagnostic of traditional maize production systems in El Dovio, Valle del Cauca, led by CGIAR centers CIMMYT, the Alliance of Bioversity-CIAT and IWMI, highlighted the challenges and opportunities in promoting agrobiodiversity and sustainable practices among smallholder farmers. Family farming dominates this region, with diverse crops like native maize grown in association with beans, plantains, and other staples. However, farmers face challenges such as the loss of traditional practices, insufficient seed conservation, and declining soil fertility. To address these issues, circular economy principles were introduced during collaborative workshops, emphasizing the recycling of organic waste into valuable inputs for farming. By transforming agricultural residues, kitchen waste, and animal manure into bioinputs like compost, biochar, and biogas through anaerobic digestion, farmers can close nutrient cycles, reduce environmental impacts, and cut production costs. These practices not only promote sustainability but also enhance productivity while integrating nature-positive solutions into local farming systems. A key focus is on preserving native maize varieties and fostering knowledge exchange. Proposed actions include participatory trials to test bio-inputs derived from farm waste, technical assistance for establishing a community seed house, and initiatives to engage youth in maize production. Through partnerships with schools and research networks, such as "Herederos del Planeta," these efforts aim to strengthen cultural traditions, ensure food security, and integrate circular economy approaches into sustainable agricultural practices.

¹³ Part of this activity was summarized in a blog post: Conservación, manejo de los recursos naturales y economía circular para la producción de maíz en Colombia <https://www.cimmyt.org/es/blogs/conservacion-manejo-de-los-recursos-naturales-y-economia-circular-para-la-produccion-de-maiz-en-colombia/>

6. Conclusion and perspective

This report highlights the significant progress made by CIMMYT in Colombia and Burkina Faso during the implementation of the OneCGIAR Initiative on Nature Positive solutions. Key results included different diagnostics on the agrifood system in various sites of the initiative, seed systems for maize landraces and millets and farmers, and other stakeholders' perspectives on nature-positive solutions. More than 700 farmers, nearly 60% of whom are women, have been trained in better postharvest storage and handling techniques. In addition, the establishment and strengthening of community seed banks in different regions has enabled local farmers to preserve genetic diversity while ensuring food security and access to local seeds. Key stakeholders, including local farmers, community leaders and farmer organizations, participated in discussions to improve market access for local maize, helping to create linkages between smallholders and niche markets that value agrobiodiversity.

As the Initiative is transitioning to the CGIAR Multifunctional Landscapes Science Program, the useful information gathered during the Nature-Positive initiative will pave the way for future interventions in Colombia and Burkina Faso. Future activities will focus on improving farmers' capacities through participatory processes, such as participatory variety selection and the development of inclusive business models that connect smallholders to niche markets. These efforts will prioritize women's empowerment, ensuring that they continue to play a leading role in the conservation and sustainable use of local seeds. Other focus areas include strengthening the informal seed system, with continued support for community seed banks and the creation of new ones, particularly for millets in Burkina Faso. Raising awareness of the importance of biodiversity conservation will be key to mobilizing more communities and increasing the impact of these initiatives. In addition, the program will focus on advocating for policies that promote the use of bioinputs and biofactories, reducing farmers' dependence on chemical inputs, and promoting more sustainable agricultural practices.