



AGROBIODIVERSITY

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Agrobiodiversity is Key to Achieving Land Degradation Neutrality (LDN) Targets

Prepared by the organisers of the UNCCD COP15 Food Day - Seeds for Change for a Nature-Positive Future

The Land Degradation Neutrality target setting programme launched by UNCCD in 2015 provides a unique opportunity to leverage the potential of agrobiodiversity for land restoration.

Land Degradation is a global concern for food and nutrition security, sustainable development, biodiversity conservation and climatic change adaptation and mitigation. To achieve Land Degradation Neutrality (LDN), it is essential to halt and reverse degradation and to implement sustainable land management practices, which means managing land in ways that enhance and preserve biodiversity, maintain productivity, and support livelihoods and ecosystem resilience.

Agrobiodiversity – the wealth of plants, animals, and micro-organisms that make up our agri-food systems – contributes to avoiding and minimising the negative environmental impacts of agricultural activities. Conservation and sustainable use of agrobiodiversity supports farmers' livelihoods, nourishes our soils, and helps us adapt to and mitigate climate change while safeguarding biodiversity. Integrating agrobiodiversity and sustainable agricultural practices into LDN national action plans is essential to restore land and avoid further degradation.

The food we eat - and the way we produce, source, handle, and process it - impact both environmental and human health.

Today, agriculture accounts for 70% of all freshwater use¹ and drives 80% of deforestation worldwide², causing natural habitat conversion into croplands. It is also a large driver of biodiversity loss³ and contributes to climate change⁴ (mainly from changing land use, livestock production, and soil and nutrient management). The expansion of agricultural land, unsustainable agricultural practices and overharvesting of trees are all

interrelated drivers of land degradation resulting from societal changes, including population growth and economic development.

In addition to all these impacts, agriculture is failing to provide nutritious and healthy diets to everyone. Diets worldwide have become increasingly homogenous, dominated by staple crops rich in energy but poor in macronutrients.⁵ Today, only nine plant species account for 70% of total crop production, and rice, wheat and maize alone provide more than 50% of the world's plant-derived calories⁶. Feeding the human population by improving the performance and yields of a limited number of staple crops and animal breeds, combined with intensive chemical inputs, is causing severe land degradation^{7, 8}, eroding our soils and reducing nutritional value of food through lower concentrations of vitamins and micronutrients. Land degradation has already reduced the productivity of nearly one-quarter of the global land surface, affected the well-being of about 3.2 billion people, and cost about 10% of annual global gross domestic product in lost ecosystem services.⁹

To tackle these global challenges, we have an underused strategic asset in our toolbox – agrobiodiversity. This wealth of neglected edible plants could be unlocked to support sustainable agriculture and at the same time, ensure food security and nutrition, and protect the environment.¹⁰ This is even more urgent now, with the financial, health and political crises putting our food systems under unprecedented stress.¹¹

Agrobiodiversity plays critical roles in fighting current global challenges, including land restoration, biodiversity conservation and climate adaptation and mitigation.

In agricultural production, agrobiodiversity supports long-term productivity and resilience by providing multiple ecosystem services. It can help control soil erosion, improve soil nutrient cycles, and increase water quality¹², contributing to improving living conditions in drylands, maintaining, and restoring land and soil productivity, and mitigating the effects of drought. Oversimplification of vegetation, particularly in areas cleared for agriculture, reduces soil protection from external forces such as wind or water. Examples of agrobiodiverse management strategies to reduce soil erosion include hedgerows (which help reduce runoff speed, facilitate infiltration, reduce wind erosion and can host beneficial species), cover crops (which protect soil from impacts of raindrops or wind erosion), agroforestry (which increases infiltration and produces mulching material), riparian buffer protection (which increases infiltration, retains sediment and reduces runoff speed), and intercropping (which reduces exposed bare soil and optimises nutrient cycling).

Agrobiodiversity can help protect plants through 'natural pest control'.^{13, 14} Monocropping increases the risk of agricultural losses to pest outbreaks and climate change. Mixing varieties or species with different functional diversity over different seasons and across different parts of the farm is an effective climate and disease management strategy¹⁵ that can help reduce the risk of pest epidemics and climate-related losses.¹⁶ Diversified landscapes also tend to have more natural pest enemies,¹⁷ fewer pests, and often greater yields.¹⁸ This strengthens farmers' livelihoods while reducing the need for synthetic fertilisers. Complex landscapes also show increased pollinator abundance and diversity,¹⁹ and contribute to conserving wild biodiversity, helping to maintain the ecological functions and services that they provide. Higher crop species diversity can lead to improved quality of produce.²⁰

Agrobiodiversity also maintains healthy soils, which provide essential ecosystem services such as carbon cycling and nutrient cycling,²¹ regulating the biological processes that underpin long-term agriculture sustainability, crop health, and climate.²² Soil quality determines how productive agricultural land is,²³ and increases its resilience against climate change. Intensive land management is associated with lower levels of soil diversity.²⁴ Some agrobiodiverse management interventions that farmers can undertake to positively impact soil diversity and increase ecosystem service provision include reduced tillage systems, organic production and crop rotations.

The Land Degradation Neutrality Targets provide a unique opportunity to leverage the potential of agrobiodiversity for land restoration, biodiversity conservation and climate action.

For agrobiodiversity to bring these benefits and help deliver progress on the 2030 Agenda for Sustainable Development, its use needs to be strengthened in food systems, including in production systems. This can be done by:²⁵

1. *Using agrobiodiversity to support productive and resilient agricultural ecosystems and increase knowledge about its benefits:* Increased funding should be invested in upscaling and mainstreaming adoption of agrobiodiverse practices and in studying the thousands of species, breeds, strains, and varieties that remain largely overlooked by agricultural research and development efforts. Funding should also encourage participatory research methods, where scientists, farmers, and Indigenous Peoples work side by side, to ensure that both scientific and Indigenous Peoples' traditional knowledge about local agrobiodiversity can be exchanged and used.
2. *Creating incentives and markets for diversified production:* Markets for diverse food products are essential to stimulate sustainable production through increased consumer demand. Market demand can be encouraged through public procurement programs, subsidies, and promotional campaigns. Investment along the entire value chain is also essential for food systems transformation.
3. *Increasing access to and exchange of quality seed and planting material through resilient and efficient systems that meet farmers' needs and build capacity in using sustainable management practices:* Diversification of crops, forages, trees, livestock, fish, and aquatic organisms gives farmers more options in times of need. This needs to be combined with access to knowledge about which options best suit farmers' needs as well as access to diverse, high-quality seed, and planting material. Establishing community-based approaches, such as seedbanks, can strengthen local seed systems, including through open-source approaches, running participatory improvement programs, and engaging rural producers in evaluation trials. Setting in place government policies that facilitate the registration of seed varieties, local breeds, and strains, and ensure market access for traditional and locally adapted varieties and other products is also critical.

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