Biological Diversity in Agriculture

Our work

Farmer with plate of food in Malawi. Photo: Julie Lunde Lillesæter

All plant species and food crops possess diverse traits that render them resilient against destruction. Hence, conserving biological diversity in farmers' fields constitutes a pivotal aspect of The Development Fund's efforts towards food security.

What is biological diversity?

Biological diversity, also known as biodiversity, encompasses the variety of living organisms and ecosystems. When utilised by humans for food and agriculture, this diversity is referred to as agrobiodiversity (Dulloo, 2019). Such diversity stands as a key factor enabling small-scale farmers in rural areas to survive (FAO, 2019). Farmers require plant varieties adapted to local cultivation conditions, capable of withstanding various climate challenges. Certain plants exhibit special resistance against pests and diseases, while others can thrive in poor soil, drought, or flooding conditions. To ensure sufficient food production, plants resilient to such conditions are imperative. Thus, a diversity of plant varieties and species serves as farmers' primary safety net amidst climate change (Sunderland, 2011).

Why is biological diversity essential for food security?

The amount of people facing hunger is on the rise, with the majority of those affected being small-scale farmers in the Global South. Smallholder farmers are particularly vulnerable to climate change-induced phenomena such as prolonged droughts, erratic rainfall patterns, temperature fluctuations, and frost, resulting in crop losses and diminished food availability (Ceres2030, 2020).

Amidst this unpredictable climate, a diversity of plant species stands as a critical safety mechanism for smallholder farmers, who constitute the backbone of food security in the world's poorest nations (Tscharntke et al., 2012). By cultivating various food crops with diverse traits, smallholder farmers mitigate the risk of crop losses due to diseases, pests, droughts, frost, or excessive rainfall. For instance, if maize crops fail due to unforeseen droughts, millet can ensure sustenance as it is more drought-tolerant.

Different variations of maize in Guatemala. Photo: Carlos Zaparolli

How do farmers preserve biological diversity?

The genes and genetic combinations constituting biological diversity are referred to as genetic resources. These resources sustain current food production and livelihoods for farmers all over the world. We are also dependent on these resources for our future needs.

Since the inception of agriculture, farmers have preserved and cultivated an immensely rich diversity of plant species and food crops. This diversity is indispensable for developing new plant varieties capable of coping with climate change and enhancing future food security (FAO, 2020). Often, these varieties are exclusively found in farmers' fields or seed banks, making the farmer's field the world's most crucial gene bank. The diversity preserved by farmers also embodies a significant aspect of culture and tradition, with different plant varieties used for various culinary purposes based on taste, colour, and other characteristics.

How do farmers utilise biological diversity?

Biological diversity forms an integral part of farmers' own seed systems, also known as informal or traditional seed systems. Through these seed systems, farmers conserve, utilise, exchange, or sell seeds harvested from their own crops, encompassing both traditional and modern varieties tailored to diverse cultivation conditions, microclimates, usage, and taste preferences.

Farmers' Rights

The concept of "Farmers' Rights" pertains to the rights farmers hold regarding the use of seeds and plant genetic diversity. The International Treaty on Plant Genetic Resources for Food and Agriculture includes a specific article on Farmers' Rights, encompassing:

- The right to protection of traditional knowledge related to plant genetic resources
- The right to participate in a fair distribution of benefits arising from the utilisation of plant genetic resources
- The right to participate in decisions concerning the conservation and sustainable use of plant genetic resources at a national level
- The right to conserve, use, exchange, and sell seeds and propagating material from their own harvest in accordance with national legislation.

A significant portion of the seeds utilised in food production in the Global South emanates from farmers' seed systems, playing a pivotal role in food security (Andersen, 2023).

Seeds from a seedbank in Somalia. Photo: Kristoffer Nyborg

Why is biological diversity threatened?

Over the past century, approximately 75% of plant genetic diversity is estimated to have been lost (FAO, 2004). The remaining diversity, critical for future food security and the preservation of culture and traditions, is also under threat and at risk of being lost.

The causes behind the increasing loss of biodiversity are multifaceted, stemming from factors such as climate change, demographic shifts, and international markets, leading to agricultural intensification, changes in land management and utilisation, heightened pressure on natural resources, and pollution (FAO, 2019).

The introduction of modern plant varieties since the Green Revolution has resulted in the loss of many traditional crop varieties such as rice and wheat. While subsidy programs distributing modern varieties or hybrids may provide farmers access to seeds, they may also lead to production uniformity, ultimately resulting in genetic erosion. Although modern varieties can enhance yields under specific conditions, they cannot supplant traditional varieties, often more resilient and better suited to diverse climatic conditions. The increasing acceptance of genetically modified organisms (GMOs) poses a burgeoning threat to genetic diversity. Current GMOs

primarily cater to uniform agricultural production, elevating the risk of genetic pollution, erosion, and loss of plant diversity.

The absence of national laws and frameworks supporting farmers' seed systems and rights to seeds exacerbates diversity loss. Pressure mounts on many developing nations to enact stringent variety protection laws, constraining the use of diverse varieties and undermining farmers' rights to seed.

Various food plants in Malawi. Photo: Julie Lunde Lillesæter

How does The Development Fund address biological diversity?

Local seed banks to strengthen farmers' seed systems: Preservation and use of seeds are the cornerstone of food production. The Development Fund establishes and supports the operation of local seed banks that farmers can utilise. Through these seed banks, farmers have a stable and secure source of seeds at the beginning of each season. In the event of a crisis such as drought or flood destroying farmers' crops, the seed banks store a selection of various important seed varieties that farmers can use. Without such a backup, we risk losing crucial plant varieties.

Participatory variety selection for increased control over their own production: Through the seed bank, farmers can test out different varieties and see how they

perform in their fields. Farmers evaluate which varieties work best in the context they are used in and decide which ones they prefer to cultivate. This way, farmers can choose the varieties they believe suit them best, instead of purchasing seeds recommended by seed stores or large seed producers.

Seed bank in Malawi. Photo: Julie Lunde Lillesæter

Facilitation of various types of plant breeding: Plant breeding involves improving the characteristics of different food crops by developing new varieties so that they have better yield capacity, resistance, hardiness, taste, or other desired traits. Through participatory plant breeding, farmers can cross and develop new varieties of food crops. They can also enhance varieties by selecting seeds from the best plants. For example, if they want maize to have a thick stem to withstand wind better, they choose seeds from maize with the thickest stems. Or they need plants that can withstand drought or grow faster. Through participatory plant breeding, farmers and plant breeders collaborate so that farmers can bring out the traits in plants that suit them best.

Rehabilitation of varieties that have been on the verge of disappearing: Over time, it happens that plant varieties lose some of their characteristics. The Development Fund supports efforts to identify varieties that are at risk of being lost

or are underutilised so that these can be cultivated and improved through participatory variety improvement.

Identification and characterisation of wild relatives: The Development Fund facilitates farmers in mapping and identifying wild relatives in the area. For example, there are wild relatives of rice that have not yet been developed into rice plants. The characteristics of these relatives are mapped so that the materials can be stored in gene banks.

Advocacy for farmers' rights to seeds: Collaboration with partners aims to strengthen international frameworks and national laws safeguarding farmers' rights. Initiatives include participation in international forums and supporting advocacy efforts at national levels. Internationally, we particularly engage with the International Treaty on Plant Genetic Resources for Food and Agriculture and monitor negotiations as part of official delegations or civil society. The Development Fund also tracks processes and negotiations within The International Union for the Protection of New Varieties of Plants (UPOV). At the national level, we support our partners' advocacy efforts regarding seed laws and variety protection laws to ensure they uphold farmers' rights. Additionally, we are part of an international network, APBREBES, which works to promote farmers' rights. The measures we implement in our projects, such as seed banks and participatory plant breeding, are also recognized as important steps towards implementing farmers' rights as enshrined in the International Plant Treaty.

Would you like to learn even more?

- International Treaty on Plant Genetic Resources for Food and Agriculture
- Farmers Rights.org from the Fridtjof Nansen Institute
- The Development Fund's GMO-policy
- The Development Fund's Farmer's Rights-policy

Would you like to support The Development Fund's work?

- Here you can read about how you can get involved in our work against hunger and injustice

References

Andersen, R. (2023). FARMER-MANAGED SEED SYSTEMS, COMMUNITY SEED BANKS AND FARMERS' RIGHTS – A SYNTHESIS. Retrieved from: https://www.farmersrights.org/getfile.php/133474-1695234206/Dokumenter/Synthesis%20Note%20for%20the%20Global%20Symposium%20on%20Farmers%20Rights.pdf

Ceres2030. (2020). Sustainable Solutions to End Hunger. Summary Report. Retrieved from: https://ceres2030.iisd.org/wp-content/uploads/2021/03/ceres2030_en-summary-report.pdf

Dulloo, M. E. (2019). Maintaining Diversity of Plant Genetic Resources as a Basis for Food Security. Encyclopedia of Food Security and Sustainability. Elsevier. 54-63. Retrieved from: https://doi.org/10.1016/B978-0-08-100596-5.22208-7.

FAO. (2020). How the world's food security depends on biodiversity. Retrieved from: https://www.fao.org/3/cb0416en/CB0416EN.pdf

FAO. (2019). The state of the world's biodiversity for food and agriculture. Retrieved from: https://www.fao.org/3/CA3129EN/CA3129EN.pdf

FAO. (2004). What is happening to agrobiodiversity? *Building on Gender, Agrobiodiversity and Local Knowledge.* Retrieved from: https://www.fao.org/3/y5609e/y5609e02.htm

Sunderland, T.C.H. (2011). Food security: why is biodiversity important? *International Forestry Review*. 13:3. 265-274. Retrieved from: https://doi.org/10.1505/146554811798293908

Tscharntke, T., Clough, Y., Wanger, T.C., Jackson, L., Motzke, I., Perfecto, I., Vandermeer, J. & Whitbread, A. (2012) Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation*. 151:1. 53-59. Retrieved from: https://doi.org/10.1016/j.biocon.2012.01.068