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Dynaversity concepts for agrobiodiversity

DYNAVERSITY

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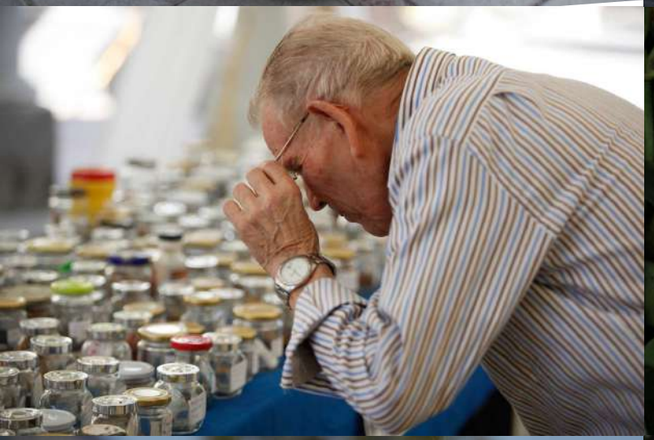


5 Concepts for agrobiodiversity

Since the green revolution, crop genetic diversity is seriously lost. Only three plants provide 60% of the human diet's calories (maize, rice and wheat)[1]. When seeking to promote production and consumption systems with greater agrobiodiversity and the revaluation of plant genetic diversity as the foundation of our food, nutritional and economic security, the DYNAVERSITY project identified five main building blocks, defining common terms to create new network opportunities and capacity building activities across Europe. Our overall goal is to provide a common knowledge base about the conservation of plant genetic resources for food and agriculture.

About DYNAVERSITY

DYNAVERSITY is a European Project funded by the European Union's Horizon 2020 Research and Innovation program. It facilitates the integration of scientific and practical knowledge on managing diversity in agriculture and the entire food chain, restoring evolutionary and adaptation processes. DYNAVERSITY worked to increase capacities for *in situ* conservation of plant genetic resources by mapping and bringing together all stakeholders involved in the dynamic management of plant genetic resources.

1 IPES-Food, 2016, From uniformity to diversity: a paradigm Shift. International Panel of Experts on Sustainable Food systems.

1. Seeds and Plant Varieties

SEED: It is technically defined as the botanical term for the reproductive material produced from a fertilized flowering plant. But in the agrobiodiversity framework, we can use the word 'seed' more widely to include other types of plant reproductive material, including roots, tubers, and cuttings.

VARIETY: A term used in plant classification below the species level. Old and local varieties were selected from landraces over time and often separated geographically. Still, modern varieties are developed using various plant breeding techniques. Stable and uniform varieties are important to market seeds and plants, but the maintenance of stable varieties can interfere with the continued evolution and genetic diversity of seeds and plants.

Plants and people have co-evolved over centuries. Different types of plant varieties have developed through an interaction of human and natural selection processes. Human knowledge surrounding seeds, plant varieties, and local food systems has evolved, resulting in landraces and farmers' varieties, and is often location-specific. **Specialized plant breeding** is a relatively recent development in the long history of the evolution of different seeds and plant varieties. Framing plant breeding through the lenses of "**modernization**" and "i**mprovement**" posits all other types of seeds and varieties as backwards and inferior. Yet too much reliance on plant breeding in laboratories at the expense of farmer management and selection systems has devalued or delegitimized **farmer knowledge and practices** and deskilled farmers.

But in the case of **on-farm plant breeding**, farmers and gardeners develop new skills of **seed saving** and **selection methods**, which are completely different from modern plant breeding. Such training is often organized by seed-savers' groups and seed networks, which re-frames these problems and forms new modes of social organization and social relations centred around **seed exchange** and **plant breeding**. Within this contest, seeds and plant varieties become the building blocks to create new **seed networks**.

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2. Seed networks for plant genetic diversity

SEED NETWORKS: Communities of interaction have a shared interest in seed management and reproduction, and food consumption. These include broader networks through which seed circulates and is exchanged or traded for research, use, and conservation purposes.

GENETIC DIVERSITY: The presence of genetic variability within a species, both within and across populations and varieties. These genetic differences allow for adaptation and increase the potential to breed for specific characteristics.

Both **farmers** and **specialized breeders** possess important knowledge and engage in key practices to save, manage, and reproduce seeds and plant varieties.

Since the advent of specialized breeding and increasingly strict seed regulations, a divide has developed in the seed system between what has been called the "**formal seed system**", through which commercial, "modern," "improved" varieties and "certified" seeds circulate, and the "**informal seed system**", based on the continuous exchange of seeds between farmers and gardeners. In parallel, crop diversity began to be considered as a "resource" for breeding purposes.

Both "formal" and "informal" seed systems rely on different context-based knowledge; it is not only the **contexts** that differ (laboratory versus farm) but the overall **paradigm**: one is based on the **market**, while the other is based on a more **holistic understanding of life**. Framing seed systems as "formal" or "informal" gives an impression of the latter as less important or producing seeds of lesser quality, which is inaccurate.

Complementary seed networks are fundamental in establishing social relations around **seed exchange** that can help maintain genetic diversity and agrobiodiversity, as long as there is transparency about breeding methods.

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3. Conservation of Plant Genetic Resources

CONSERVATION: One of the main aims of the FAO Plant Treaty is the Conservation of Plant Genetic Resources. This means maintaining the full range of genetic variation within particular species. This is done by maintaining the farming systems through which this variability emerged and has been maintained in the past (*in situ* or on farm conservation), and by storing copies of currently existing plant genetic resources in genebanks (*ex situ* conservation).

How can we conserve agricultural diversity for future generations?

Seeds and plant varieties developed by farmers over generations are currently valuable both as **living organisms** and as **plant genetic resources**. The diversity of these plant genetic resources together constitutes the agrobiodiversity of our food systems. The preservation of plant genetic diversity for future generations is now through either ***ex situ*** or ***in situ*** conservation approaches.

I*n situ* and *ex situ* approaches to conservation require specific knowledge and practices to **develop** (*in situ*) and to **maintain** (*ex situ*) plant genetic resources for the future. *In situ* conservation is important to promote a broader **agroecological transition** in agricultural systems. **Innovative hybrid forms**, such as dynamic management of plant genetic resources, are needed, as well as **new modes of organizing on farm breeding** to face future environmental changes.

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4. Agrobiodiversity Governance

INTERNATIONAL TREATY FOR PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE: The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA or "FAO Plant Treaty") was signed in 2001 and entered into force in 2004 intending to create a legally binding framework for the conservation and sustainable use of plant genetic resources, or seeds and plant varieties. It defined for the first time farmers' rights as a counterweight to breeders' rights. It created a multi-lateral access system for plant genetic resources stored in genebanks.

FARMERS' RIGHTS: The term 'farmers' rights' originates from the 2001 FAO Plant Treaty, which defines that farmers have the right to save, use, exchange, and sell seeds, as well as to participate in decision-making about plant genetic resources.

Seeds and plant varieties were seen as a **common resource** for generations, as they were managed and freely exchanged among farmers without any form of exclusive property rights. Since the middle of the twentieth century, seeds and plant varieties are increasingly governed by a number of **laws** and **international treaties**, many of which have begun to create private (intellectual) **property** out of seeds, plants, or their parts.

Breeders' rights have to date, been protected more than **farmer**'s rights, and access to plant genetic resources and the sharing of benefits derived from them remains uneven. Laws often favour expert knowledge and the products that result from breeding as **specialized plant science**, over the wisdom of farmers and gardeners, and even criminalize **seed exchange practices**.

Farmers are framed as **end-users** of seeds as resources rather than actual or potential **breeders and managers** of seeds and plant genetic resources. Seed networks are actively involved in negotiations over legislation and develop new ways of organizing **social relations surrounding** seeds as resistance to unjust laws.

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5. Diverse Food and Farming Systems

FOOD DEMOCRACY: Peoples' right to decide their food culture in food production, processing, and consumption, entailing citizen engagement, empowerment, and responsibility of all actors.

Access to **diverse seeds** is the foundation of **access to food**. Diverse food and agricultural systems are the cornerstones for preserving **plant genetic diversity** for future generations and creating sustainable agriculture systems.

Differences in knowledge and practices surrounding seeds and plant varieties undergird differences in visions of **agricultural sustainability** and **plant breeding approaches**.

A diverse seed supply is needed for diverse and sustainable food and agricultural systems based on **agroecology**. The frames of **food sovereignty** and **food democracy** can help re-envision and reorganize current agricultural systems along more sustainable lines.

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