COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Plant genetic resources

USE THEM OR LOSE THEM

Ever since hunter-gatherers realized some 12 000 years ago that they could save and plant seeds from season to season, the sum of the world's plant genetic resources for food and agriculture has expanded. Over the millennia, farmers learned to save seeds of crops they deemed easiest to process or store, or those most likely to survive growing seasons or even those that simply tasted the best. As a result, more than 7 000 species of plants have been cultivated or collected. Many remain important to local communities where exploiting their potential is crucial to achieving food security.

It is estimated that nowadays only 30 crops provide 95 percent of human food energy needs and just four of them – rice, wheat, maize and potatoes – provide more than 60 percent. Given the significance of a relatively small number of crops for global food security, it is of pivotal importance to conserve the diversity within these major crops. While the number of plant species that supply most of the world's energy and protein is relatively small, the diversity within such species is often immense. For example, the number of distinct varieties of the rice species *Oryza sativa,* is estimated at more than 100 000. Farm communities in the Andes cultivate more than 175 locally named potato varieties. It is this diversity within species that allows for the cultivation of crops across different regions and in different situations such as weather and soil conditions.

Plant genetic diversity may also provide valuable traits needed for meeting challenges of the future, such as adapting our crops to changing climatic conditions or outbreaks of disease. A variety of Turkish wheat, collected and stored in 1948 was ignored until the 1980s when it was found to carry genes resistant to many disease-causing fungi. Plant breeders now use those genes to breed wheat varieties that are resistant to a range of diseases. Wild botanical relatives of our food crops – often found on the periphery of cultivated lands – may contain genes that allow them to survive under stressful conditions. These genes can add important traits to their cultivated relatives, such as robustness or frost resistance.

Plant genetic resources for food security

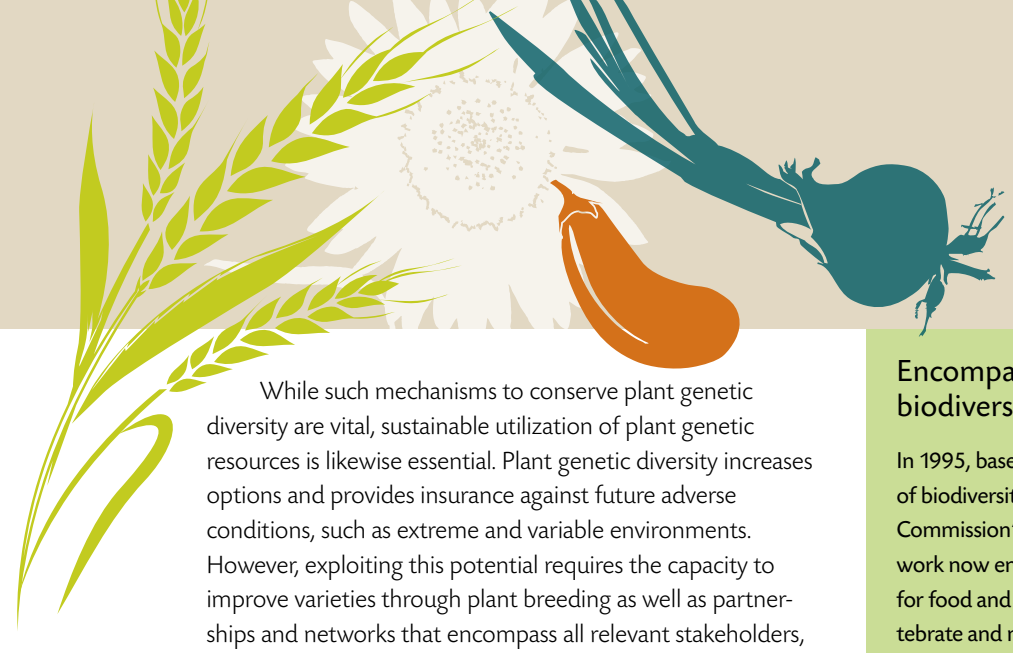
African farmers felt little need for alarm when the leaves of their cassava plants occasionally became patchy. However, in 1989, an aggressive strain of cassava mosaic disease, the virus that caused the patchiness, emerged, decimating harvests throughout the Great Lakes region. In Uganda, for instance, the virus-caused food shortages led to localized famine and major economic losses.

In response, national and international experts went into action. They tested some 100 000 cassava samples collected and exchanged among gene banks from around the world. Through a process of genetic selection, they identified a series of resistant varieties and set up nurseries in the affected countries to multiply disease-free cassava seedlings – enabling the recovery of cassava cultivation.

STEMMING THE LOSS OF PLANT GENETIC RESOURCES

Plant genetic diversity is threatened by "genetic erosion", a term coined by scientists for the loss of individual genes and of combinations of genes, such as those found in locally adapted landraces. The main cause of genetic erosion, according to FAO's *State of the World's Plant Genetic Resources for Food and Agriculture*, is the replacement of local varieties by modern varieties. As old varieties in farmers' fields are replaced by newer ones, genetic erosion frequently occurs because the genes found in the farmers' varieties are not all contained in the modern variety. In addition, the sheer number of varieties is often reduced when commercial varieties are introduced into traditional farming systems. Other causes of genetic erosion include the emergence of new pests, weeds and diseases, environmental degradation, urbanization and land clearing through deforestation and bush fires.

Traditional efforts to counter this genetic erosion concentrated on conservation of seeds in crop genebanks (*ex situ*). Today, it has become clear that the best strategy combines *ex situ* conservation with on-the-ground (*in situ)* conservation by farmers in their agro-ecosystems and of crop wild relatives in, for example, areas protected for their environmental value.



While such mechanisms to conserve plant genetic diversity are vital, sustainable utilization of plant genetic resources is likewise essential. Plant genetic diversity increases options and provides insurance against future adverse conditions, such as extreme and variable environments. However, exploiting this potential requires the capacity to improve varieties through plant breeding as well as partnerships and networks that encompass all relevant stakeholders, ranging from farmers to researchers to gene bank managers. This integrated approach is fundamental to developing mechanisms that will enable farming systems to adapt to changes, such as climate change, and to meet future needs.

THE COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Supporting global initiatives to support crop genetic diversity

The Commission on Genetic Resources for Food and Agriculture was established in 1983 as a forum to deal specifically with issues related to plant genetic resources. Within its mandate, the Commission has helped coordinate and guide a series of critical international initiatives – raising awareness in the international community of the rapid increase in genetic erosion and spearheading concerted policy-level conservation efforts. Early on, the Commission developed the Genebank Standards and the International Code of Conduct for Plant Germplasm Collecting and Transfer. These contribute to minimizing the loss of genetic diversity in seed collections and to guiding collecting missions of plant genetic resources.

In the 1990s, the Commission coordinated efforts in more than 100 countries to assess and report on the *State of the World's Plant Genetic Resources for Food and Agriculture*, and led negotiations that culminated in 1996, when 150 countries adopted the *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture*. As the first framework to succeed in integrating conservation and utilization activities, the *Global Plan of Action* also recognized the crucial roles played by farmers, seed curators and breeders in managing these resources.

Building on the *Global Plan of Action,* work proceeded on two other groundbreaking initiatives.

- **The International Treaty on Plant Genetic Resources for Food and Agriculture** – negotiated by the Commission, went into effect in 2004 and has been ratified by more than 120 countries. Through the Treaty, countries agree to establish a Multilateral System to facilitate access to genetic resources of 64 of our most important crops and forages, and to share the benefits in a fair and equitable way. The Treaty provides for sharing the benefits of using plant genetic resources through information-exchange, access to and the transfer of technology, and capacity-building. It also foresees a funding strategy to mobilize funds for programmes to help, above all, small farmers in developing countries. This funding strategy also includes the share of the monetary benefits paid under the Multilateral System.
- **The Global Crop Diversity Trust,** launched in 2004, spearheads international efforts to endow the world's most important collections of crop diversity. The Trust is an essential element of the Treaty's funding strategy, specifically supporting the *ex situ* conservation of crop genetic diversity.

The Trust, the Treaty and the Commission contribute in different but mutually supportive ways to ensure the conservation and sustainable use of plant genetic resources. The Commission and the Treaty's Governing Body cooperate to identify priority actions for the future. The Commission keeps a watchful eye on the threats to plant genetic diversity and the status and trends in its conservation and use, by guiding periodical updates of the *State of the World's Plant Genetic Resources.* As part of its Multi-Year Programme of Work, the Commission also oversees the implementation and facilitates the updating of the *Global Plan of Action*.

Encompassing all components of biodiversity for food and agriculture

In 1995, based on the increased awareness of the importance of biodiversity in achieving sustainable development, the Commission's mandate broadened. In addition to plants, its work now encompasses all other components of biodiversity for food and agriculture – animal, aquatic, forest tree, invertebrate and micro-organism genetic resources – through its Multi-Year Programme of Work.

Building respect for minor crops and diversifying our food basket

Oca, teff, fonio and canihua are underutilized crop species, but in certain parts of the world they are critical to household food and livelihood security. They are grains and tubers which although conserved and used by local communities are often overlooked by agricultural research and extension programmes. Yet, they and countless other neglected species have widespread potential to contribute to agriculture and diet diversification, bringing benefits to farmers and consumers. The *Global Plan of Action* has set the development and commercialization of underutilized crops as one of its priorities.

FOR MORE INFORMATION:

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