Global perspectives on the conservation and use of CWR

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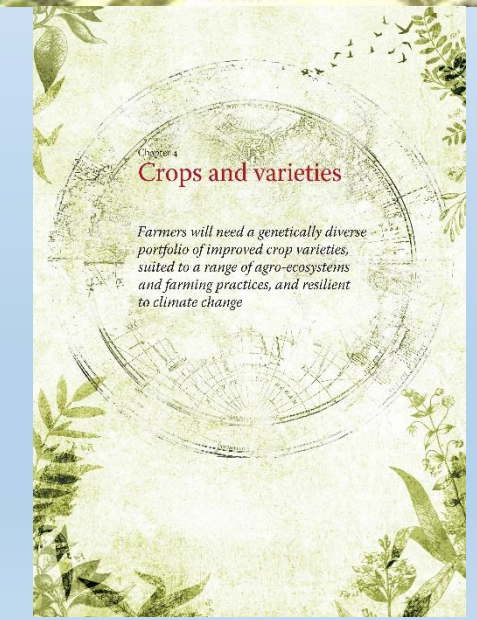
Seeds Plant Genetic Resources for Food and Agriculture at FAO

- Conservation
  - *Ex situ*
  - *In situ*
  - On-farm
- Sustainable Use
  - Plant Breeding
  - Seed Delivery Systems

Translate the potentials encoded into the genetic blueprints of PGRFA into improved productivities on farmers' fields

- Quality seeds and planting materials
- Most suitable crop varieties

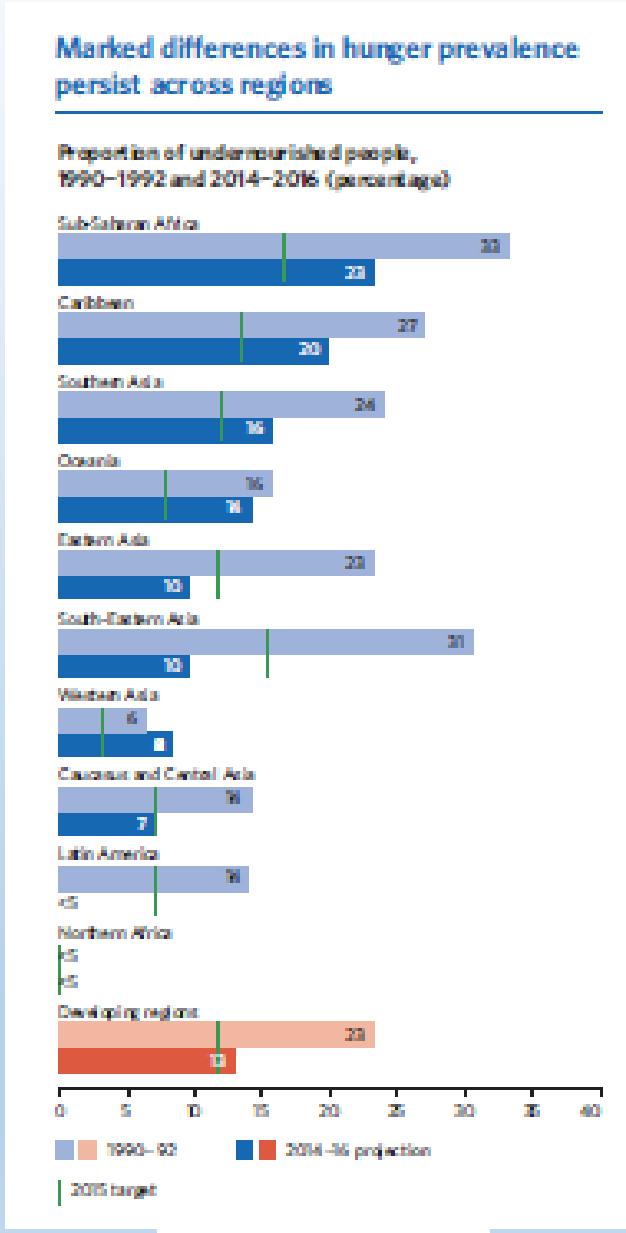


Outline

- In Context
  - Food security-related global development issues and drivers
- Imperative for harnessing PGRFA
- Normative Mechanisms
- Second GPA
  - *In situ* Conservation of PGRFA
  - Crop Wild Relatives
- Global Networking Mechanism

Profiling Food Insecurity

- Wake up call in the recent food price increases
  - Post-green revolution complacency
- About 1 billion people go hungry today
- At current rates, population by 2050 estimated at 9 billion
  - Need to produce 70% more food
- Uncertainties exacerbated, odds lessened by:
  - climate change and variations
  - demographics, changing dietary patterns
  - competing diversions of foodstuff to bioenergy, livestock feeds, fibers

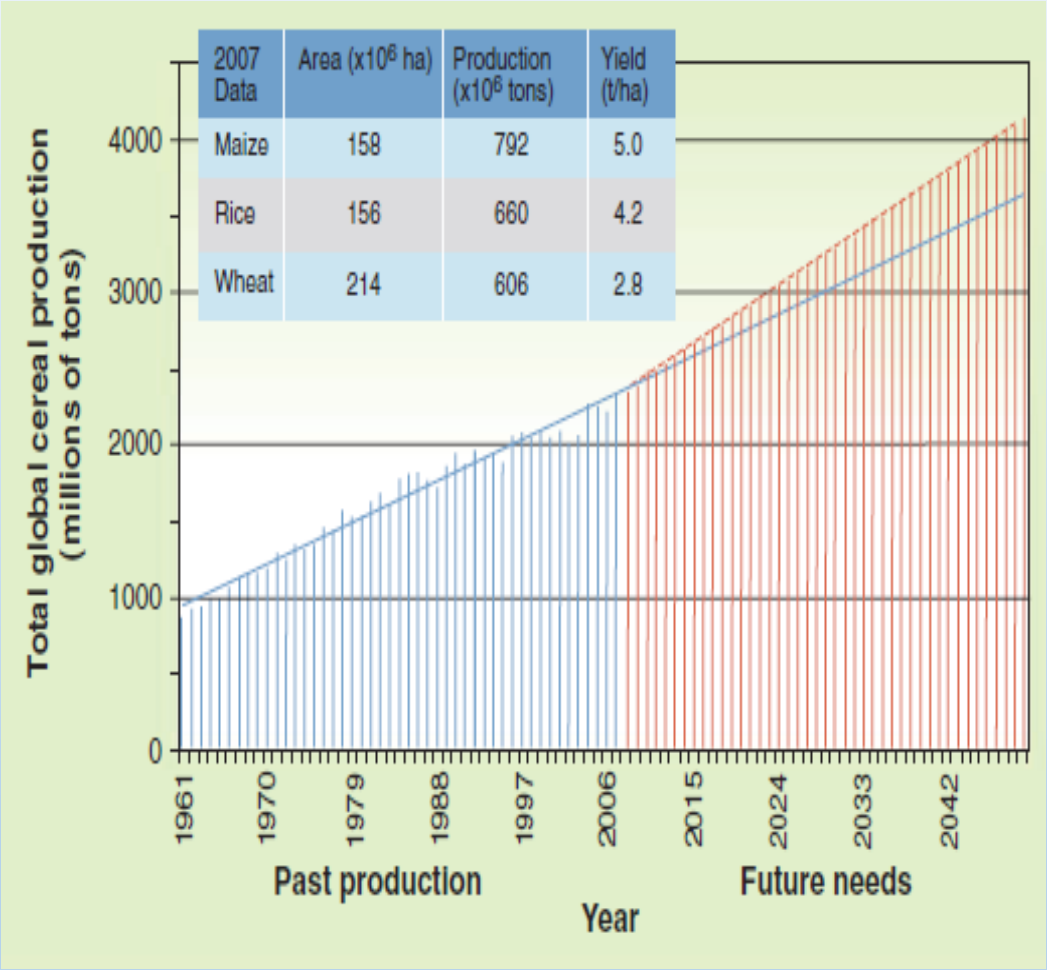


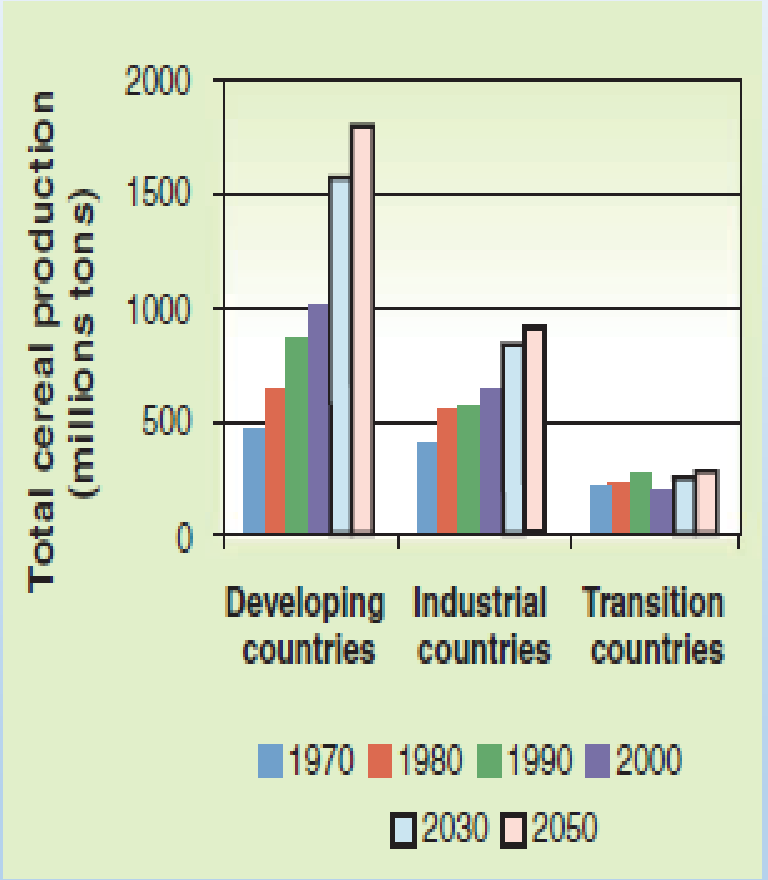
MDG Report, 2015

The Tasks Ahead

Crunching the Numbers ---

2007 Data	Area ($x10^6$ ha)	Production ($x10^6$ tons)	Yield (t/ha)
Maize	158	792	5.0
Rice	156	660	4.2
Wheat	214	606	2.8





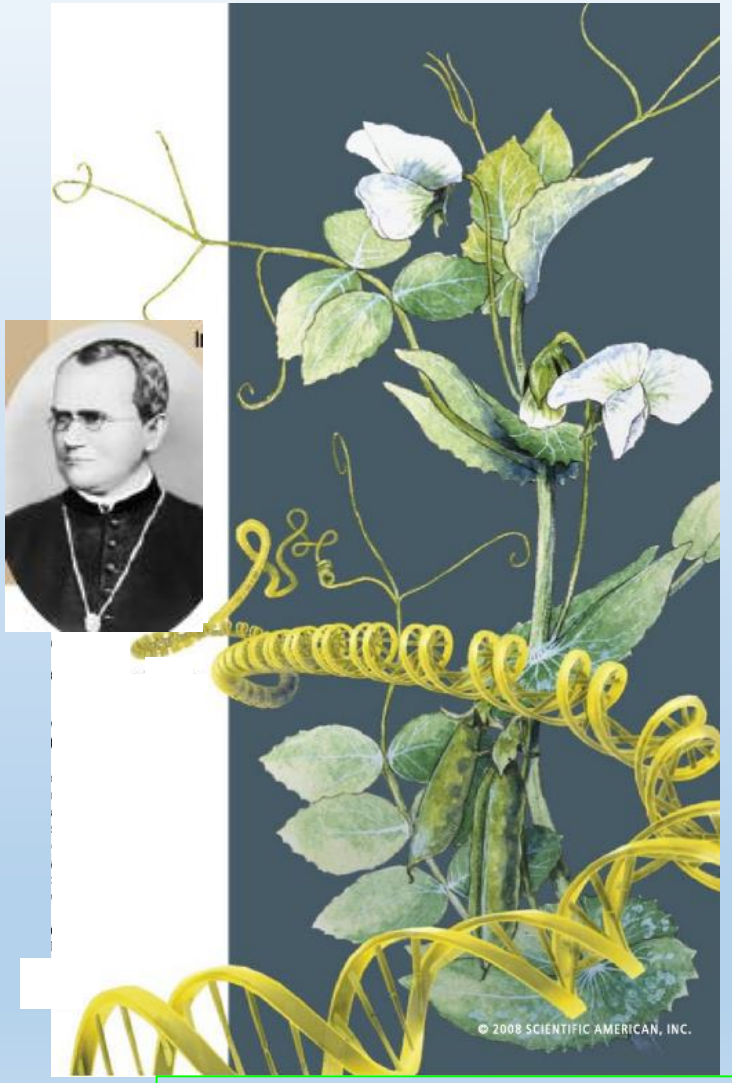
Tester and Langridge. 2010. Science 327:818-822

Increasing Crop Production ----

- Finite natural resources base
  - Available water and arable land either stagnant or dwindling
  - Prohibitive cost of agricultural inputs
- So, increased productivity is the most viable option!
  - Genetic gain accounts for 50% of increased crop yield
  - Balance is due to improved agronomic practices

Its All About Nature and Nurture!

- Re-enact the drivers for agriculture
  - Evolution, Domestication, Speciation
  - Green revolution
- Plant Breeding
  - science of altering the genetic pattern of plants in order to increase their value
- Sources of heritable variations



Scientific American, Jan. 2009

Very, very narrow genetic base

Genetic Resources and Crop Evolution (2006) 53: 379–386
DOI: 10.1007/s10722-004-0572-2

Genealogical analysis of diversity of Russian winter wheat cultivars (*Triticum aestivum L.*)

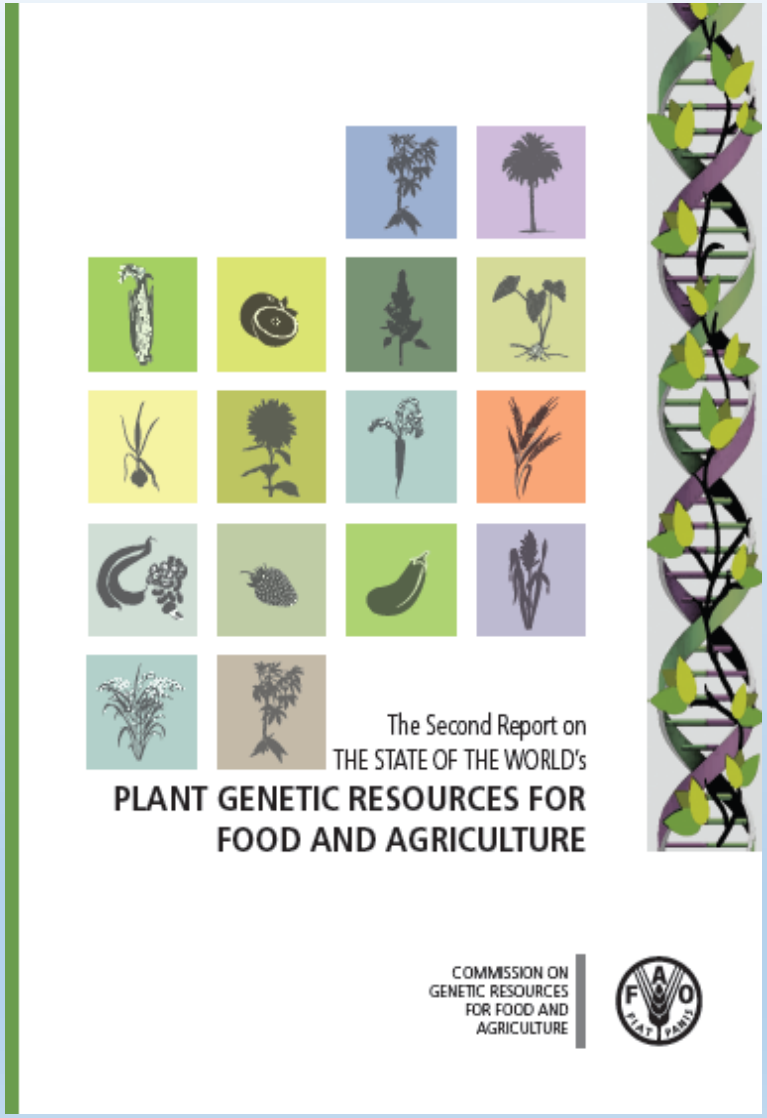
S.P. Martynov* and T.V. Dobrotvorskaya

The overwhelming majority (96%) are the descendants of cultivars Bezostaya 1 and/or Mironovskaya 808.

Plant Genetic Resources for Food and Agriculture as global commonwealth

- International Plant Protection Convention 1952
- International Undertaking on PGR in 1983
- Convention on Biological Diversity, 1992
  - contracted rather than facilitating exchange and hence, use?
- Global Plan of Action for PGRFA, 1996
- The International Treaty on Plant Genetic Resources for Food and Agriculture, 2001
- Global Crop Diversity Trust, 2004
- Second Global Plan of Action for PGRFA, 2011

State of the World's PGRFA



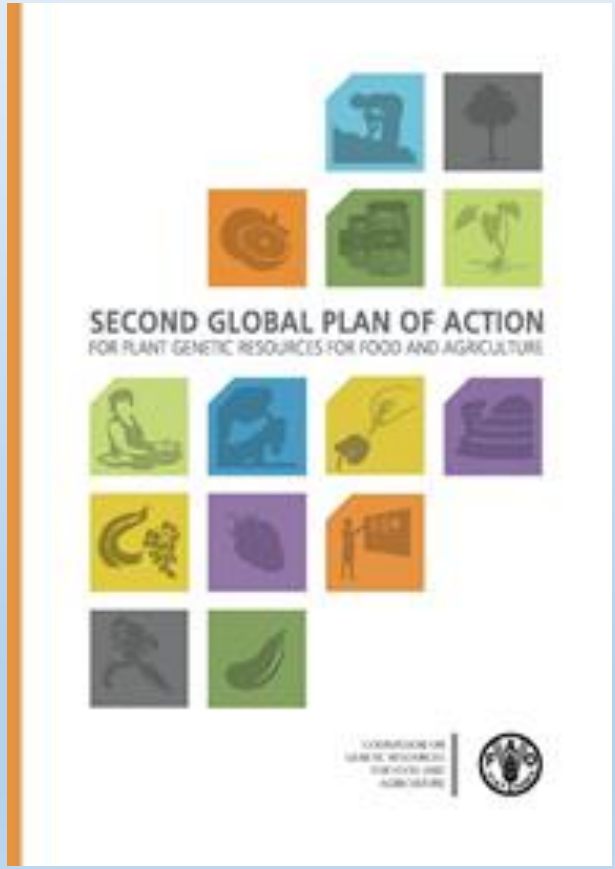
Coverage of the SoWPGR-2

- Current status of plant diversity, how it is being preserved and used
- Main achievements at the global, regional and national level
- Key technical and scientific advances
- Major gaps and needs that require urgent attention

Major Gaps and Needs in Conservation

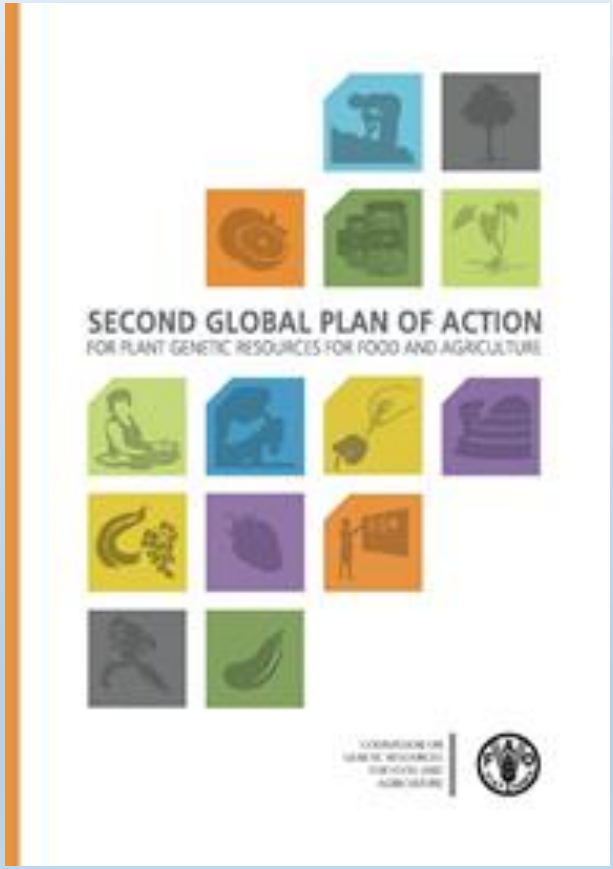
- Many genebanks with poor funding and facilities
- Large unplanned duplications (only 1-2 M samples are estimated to be unique)
- 45% of total collections held in just 7 countries, so increased need for facilitated access
- *In situ* conservation - 30% more Protected Areas but not necessarily secure
- Crop Wild Relatives poorly collected and preserved

The Second GPA



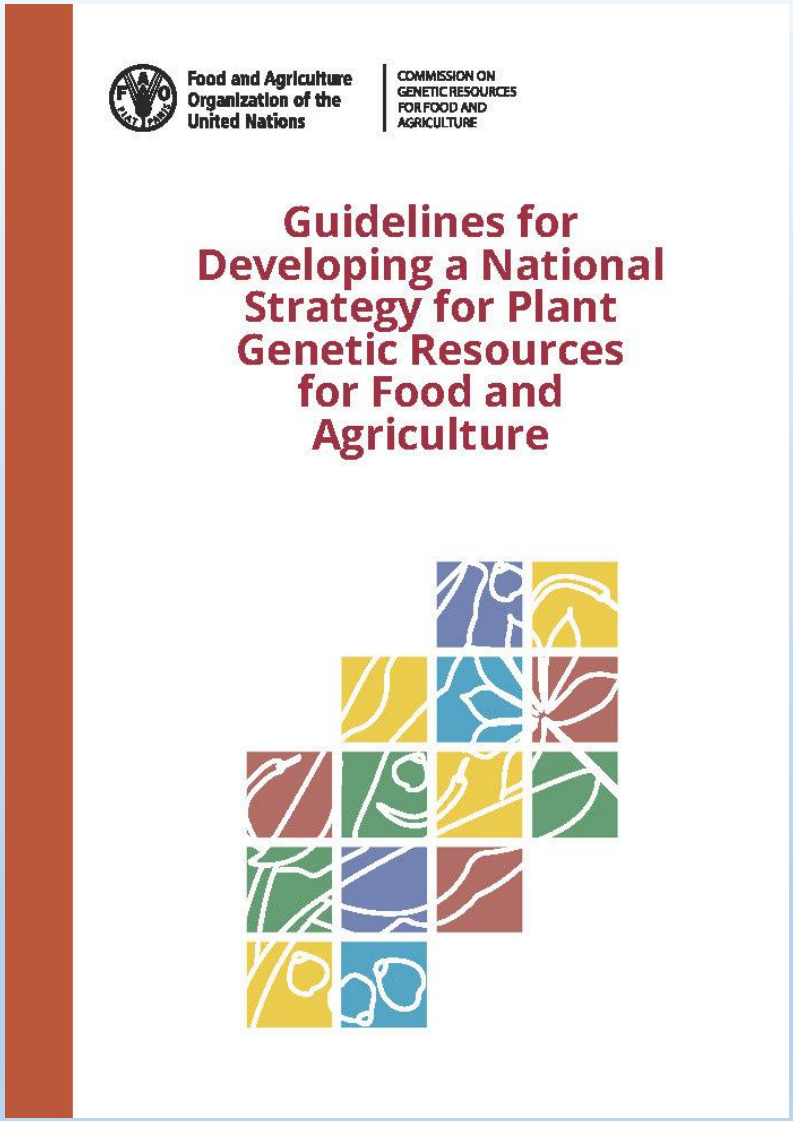
- Provides an **updated PGRFA framework**, where gaps, needs, new challenges, and policy developments are taken into consideration
- **18 Priority Activities** in four **main groups:**
  1. *In Situ* Conservation and Management
  2. *Ex Situ* Conservation
  3. Sustainable Use
  4. Building Sustainable Institutional and Human Capacities
- Will **strengthen the implementation of the Int'l Treaty** and ensure conservation and sustainable use of PGRFA at national, regional and global levels.

The Second GPA



- Adopt a **strategic approach** to PGRFA management, ensuring the participation of all relevant stakeholders
- **Link** *in situ* and *ex situ* conservation to use and seed systems
- Ensure **cooperation** between the environmental, agricultural and food sectors
- Adopt and implement adequate PGRFA-related **policies, legislation and activities**
- Promote **R&D and technology** transfer and **strengthen capacities**
- Raise **public awareness** on the importance of PGRFA
- Improve **information sharing mechanisms** and **monitoring systems** to support decision making
- Provide **adequate resources** in accordance with their specific priorities and development goals

Guidelines for Developing a National Strategy for PGRFA



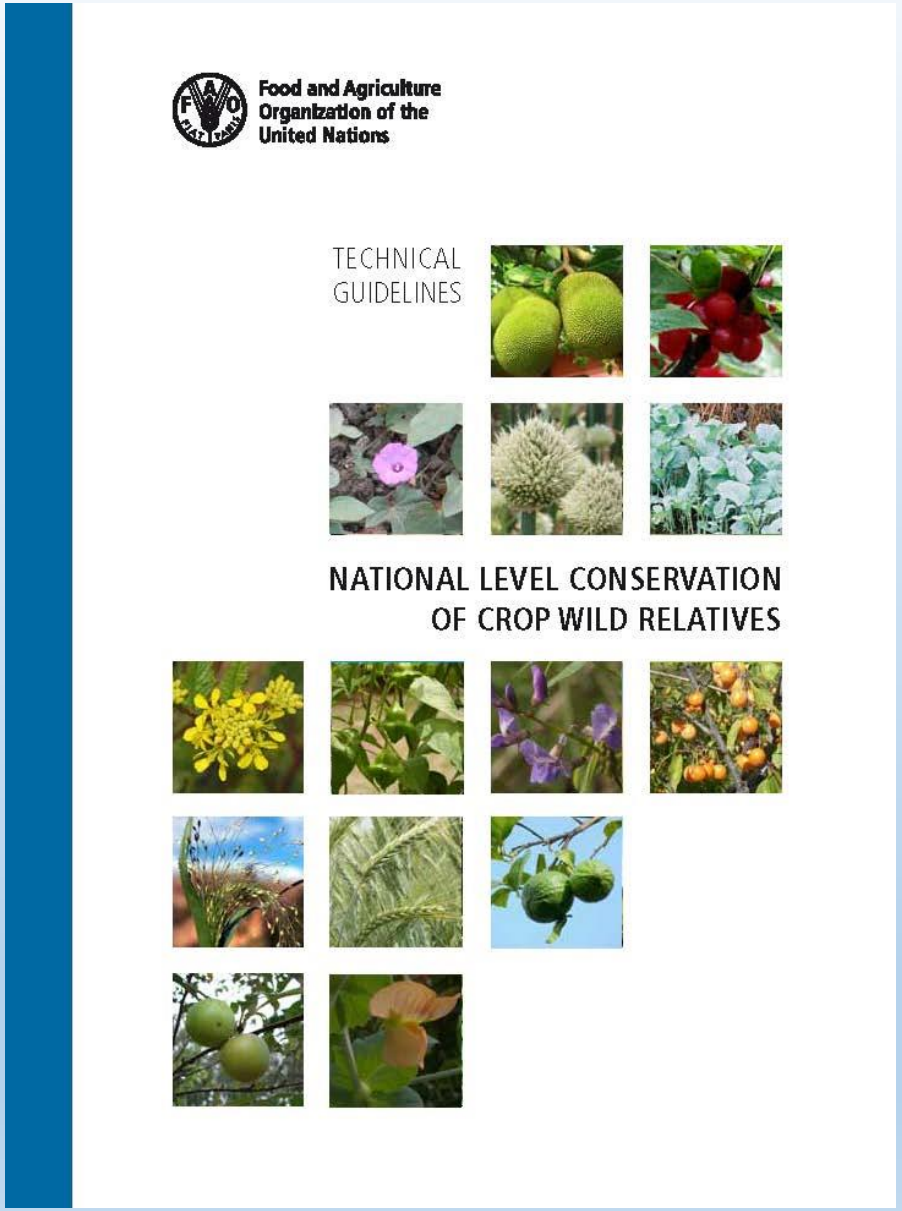
The Second GPA

In situ conservation and management	**1. Surveying and inventorying plant genetic resources for food and agriculture**
	2. Supporting on-farm management and improvement of plant genetic resources for food and agriculture
	3. Assisting farmers in disaster situations to restore crop systems
	4. Promoting *in situ* conservation and management of crop wild relatives and wild food plants
Ex situ conservation	**5. Supporting targeted collecting of plant genetic resources for food and agriculture**
	6. Sustaining and expanding ex *situ* conservation of germplasm
	7. Regenerating and multiplying ex *situ* accessions

Importance, Status of *In Situ* Conservation and On-farm Management of PGRFA

- CWR are repositories of rare alleles of genes
- Ongoing evolution
- Wild plants harvested for food
- On-farm diversity confers resilience
- Granted, progress has been made with *ex situ* conservation but hardly represents all possible heritable variations
- No overarching global mechanism for concerted action

Technical Guidelines: National Level Conservation of CWRs



GIPB

Pre-breeding for effective use of plant genetic resources

an e-Learning Course

Introduction

The Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) is pleased to announce the release of an e-learning course on *Pre-breeding for Effective Use of Plant Genetic Resources*. As part of a comprehensive strategy to develop a critical mass of personnel skilled in the genetic improvement of crops, this course aims at strengthening capacities at the interface between germplasm conservation and its use in plant breeding.

Pre-breeding refers to all activities designed to identify desirable characteristics and/or genes from unadapted materials that cannot be used directly in breeding populations and to transfer these traits to an intermediate set of materials that breeders can use further in producing new varieties for farmers. It is a necessary first step in the use of diversity arising from wild relatives and other unimproved materials.

These activities are a collaboration between the germplasm curator and the plant breeder who need to work together to understand the scope and value of germplasm collections and how new traits from these collections can be bred into new varieties. The adoption of pre-breeding facilitates the efficiency and effectiveness of crop improvement programmes by enabling increased access to, and use of, genetic variations conserved in genebanks.

Audience

The target audience for this e-learning course is primarily germplasm curators and plant breeders and their support and collaborating personnel. University lecturers and students engaged in germplasm management and/or crop improvement will also find this course very useful. The course is also recommended for extension agents, seeds specialists, field technicians and relevant research administrators and managers.

Overview of the Course Contents

The course consists of five Units which require about 16 hours of self-paced instruction to complete. The Units cover a range of theoretical and practical topics from the basic concepts and applications of pre-breeding to germplasm distribution and regulatory issues. Every lesson achieves a specific set of learning objectives, using interactive step-by-step instructions and exercises which help reinforce the internalization of the subject matter.

The course is complemented by bibliographic references including on-line resources for each Unit and a rich glossary of terms. The structure of this e-learning course, characterized by stand-alone Units, allows the learner to take the course as a whole or select specific lessons depending on individual needs and circumstances.

http://km.fao.org/gipb/

Standalone CD Version of the Course

GIPB

Course Description

This e-learning course on "Pre-breeding for Effective Use of Plant Genetic Resources" has been designed to strengthen capacity for result-oriented genetic improvement of crops.

The course, developed by world experts in different disciplines, integrates information relating to genebank management, pre-breeding, plant breeding and molecular techniques into a systematic and comprehensive resource for anyone involved in pre-breeding.

About GIPB

The Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) is a platform of public, private and civil society institutions around the world that have a track record of success in supporting agricultural research and development and are committed to working in partnership with country programmes to develop stronger and more effective plant breeding capacity.

Technical Specifications and Requirements

This CD-ROM requires a Microsoft® Windows® 98 or later operating system. The minimum system requirements to operate the CD-ROM are a Pentium I or equivalent processor, 64 Mb RAM (128 recommended), and 800x600 screen resolution with 16-bit colour depth. The CD-ROM contains all the software necessary for accessing and completing the lessons.

Contact Information

E-mail: gipb@fao.org
Website: http://km.fao.org/gipb/

Includes Adobe Reader

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GIPB

Pre-breeding for effective use of plant genetic resources

e-learning course

Sponsoring Organizations:

Bioversity International

GLOBAL CROP DIVERSITY TRUST
A Foundation for Food Security

FAO

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GIPB

Pre-breeding to build capacity
for effective use of plant genetic resources

Additional Info | Back to Lesson

COURSE MENU

UNITS

1.	Introduction to Pre-breeding
2.	Genebank Management relevant to Pre-breeding
3.	Pre-breeding Project Management
4.	Creating and Managing Variation
5.	Distributing, Use and Regulatory Issues

LESSONS

1.1	Definition and Scope of Pre-breeding	PLP
1.2	Pre-breeding in Context	PLP
1.3	Basic Concepts for Pre-breeding	PLP
1.4	Applications of Basic Concepts to Pre-breeding	PLP

DESCRIPTION

Unit 1:
Explains defines pre-breeding and its context, identifying the situations to which it is best applied and its possible limitations. The potential of pre-breeding to make optimal use of the benefits represented by Plant Genetic Resources is also outlined. The unit introduces the criteria to define when pre-breeding is an advisable option, and introduces basic concepts of plant biology and genetics necessary to set up a successful pre-breeding programme.

Select a unit to see the list of its lessons. To start a lesson, please select the lesson from the list and press the **"GO"** button or **double-click** the lesson.

GO

Global Network for *In situ* & On-farm

The Commission for Genetic Resources for Food and Agriculture, at its 13th Session in **2011**, requested FAO to elaborate on the means and opportunities for establishing a global network for *in situ* conservation and on-farm management of PGRFA

In response, FAO:

- Undertook a global survey
- Organized two technical workshops
- Outcomes presented to the Commission at its 14th Session in **2013**

Global Network for *In situ* & On-farm

The Commission at its 14th Session in **2013** requested FAO to prepare a concept note, detailing the structure, function and financial implications of two separate networks or a single network

In response, FAO:

- Held a consultative workshop in 2014
- Presented a concept note on global networking on in situ conservation and on-farm management of PGRFA to the last session of the Commission, **2015**

Global Network for *In situ* & On-farm

The Commission at its 15th Session in **2015** requested FAO to convene a multistakeholder dialogue and revise the concept note in light of the outcomes of the dialogue

- In response, FAO has now convened the multistakeholder dialogue
- To brainstorm on the options for establishing a global network(s)
- Will present revised concept note at the Commission's 16th Session early **2017**

Multi-stakeholder Dialogue

Food and Agriculture Organization of the United Nations | COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

CGRFA/MS-DIALOGUE/REPORT

Informal Multistakeholder Dialogue on *In Situ* Conservation and On-Farm management of Plant Genetic Resources For Food and Agriculture - Options for Global Networking

Rome, Italy, 6 – 7 June 2016

- 75 participants
- Members FAO's Commission on Genetic Resources for Food and Agriculture
- Non-governmental and civil society organizations, indigenous peoples and local communities, farmers, breeders and the private sector

Conclusion

Working Group should consider recommending to the Commission to request FAO to facilitate the convening of a first network meeting which could further discuss and refine the goals, functions and governance structure of a global networking mechanism.

Goals and Functions?

- Awareness-raising at global, regional and national levels
- Sharing of information and experience
- Strengthening of partnerships and linkages for "communities of practice"
- Generation of tools, coordination and implementation of initiatives and interventions
- Implementation of evidence-based interventions at scale
- Mainstreaming the conservation of PGRFA in nature reserves and other protected areas

Structure?

- Group of interconnected stakeholders
- Open structure to improve and strengthen **existing** national and regional networks
- Facilitation Committee for coordination and support in the initial phase
  - An initial "community of practice" set up as a common platform where information, lessons, tools and methodologies can be disseminated
  - "Community of practice" may be convened around one or several multi-stakeholder projects

In the short-term?

- Initiate a participatory process for consultations and assembly of potential members
- Collectively identify global priorities
- Identify joint initiatives
- Compile, validate, standardize and disseminate information and knowledge
- Raise awareness

In the long-term?

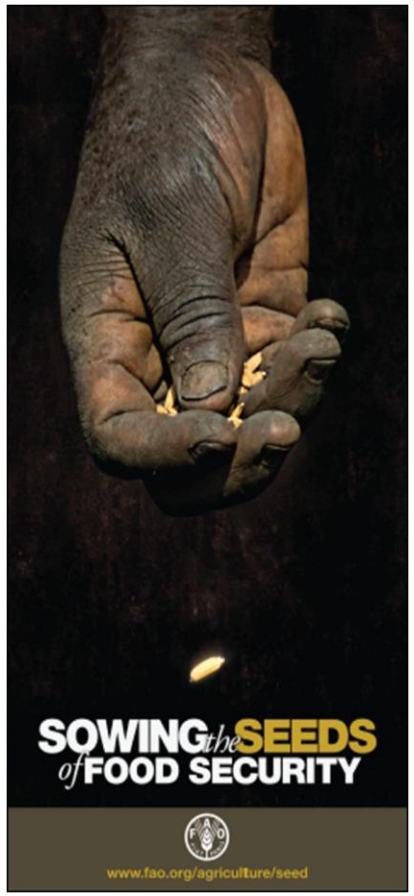
- Promote research, including community-based and participatory endeavours
- Support access to, and disseminate, innovative technologies
- Identify and monitor threats and vulnerabilities relevant to the domains
- Act as a ‘clearinghouse’
- Leverage resources and explore sustainable mechanisms for fundraising to support relevant activities

Financial Implications?

- Preliminary work related to the establishment of a "community of practice"
- Establishment and funding of the Facilitation Committee and a possible Secretariat
- Initial activities, related to information compilation, standardization and dissemination, elaboration of knowledge tools and capacity building
- Raising awareness of the subject matters and the importance of a global network

One or Two Networks?

Parameters	One Network	Two Networks
Function	Greater in-depth and deliberative considerations	Approaches have unique features; different targets, methods, and approaches
Structure	Avoids redundancy	Separate networks respond better to the need for tailored approaches
Governance	May require less staff and overhead costs	No unifying mechanism for driving the management of PGRFA that are not held ex situ
Financial Implications	Would cost significantly less, possibly as low as 50%.	



Thank you very much!!!