Contribution of Plant Genetic Resources to Food Security and Nutrition

by Stefano Diulgheroff and Didier Bazile
Plant Production and Protection Division

CGRFA Special Event - Food security and genetic diversity
Introduction

PGRFA support the livelihoods of everyone

Specialization
based on ex situ PGR

High inputs:
Monoculture/focus on major crops
High-yielding improved varieties
Seed industry/Biotechnologies
Mechanization/Low labour
Global, agro-industrial markets

Diversification
based on on-farm PGR

Low inputs:
Multiple crops and varieties
Traditional varieties
Self/local seed supply
Labour intensive
Local markets/self consumption
Physical AVAILABILITY of food:

- During the past 50 years, largest advances in food production have come from a combination of improved varieties and a greater use of external inputs.

- The largest share of investments -> specialized systems .. with lower impact

- Important margin of improvement in low input systems

*(World Agri. Pop. 2.6 billions, 82%<1ha)*
Physical AVAILABILITY of food:

*Increasing food production through sustainable intensification*

**Resources-conserving technologies with high use of PGRFA/plant diversity** can increase agricultural productivity (+79% based on 198 projects across 8 categories of farming systems in 57 countries - Pretty *et al.* 2006, 2011)

**Diversity** in space and across time is positively correlated to an average increase in crop yield (Le Roux *et al.*, 2008. Collective expertise, INRA-France)

**Improved varieties and quality seed for diversified systems**

**Trade-offs:** PGR/crop diversity can boost yields over the long term although it does not guarantee stronger instant returns => it’s knowledge and labor intensive and needs to be evaluated over a medium term dimension.
Economic and Physical ACCESS to food:

Plant Genetic Resources: do not use them, it’s losing them

- Food diversity supply in markets much lower than in farmers’ fields
- Consumer’s habit and purchasing power affect demand for food diversity in markets and influence market standards
- Raising awareness, passing on culinary traditions to new generations

Local production and consumption circuits

- Institutional procurement programmes (IPPs) have the potential to offer close-to-home and long-term formal markets for small-scale farmers.
- Market recognition of PGR diversity: e.g. Denomination of Origin (DO) for landraces

Synergies: Consuming food diversity serves to maintain PGR diversity and support rural development

7000 plant species used as food in the world

Only 150 species have commercial importance, of which 103 species represent 90% of the food production

3 species (wheat, rice and maize) represent 56% of the calories consumed by humans

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Food UTILIZATION:

*What is the nutritional cost of increasing yields?*

Nutritional value of several crops has been shown to be negatively correlated to yields.

⇒ *Trade-offs* between yields and nutrients in food

Multi-criteria plant selection efforts to enhance food nutritional value

NUS with valuable nutritional content and potential for yield increase (e.g. quinoa, tef, fonio, ...).

*Adapted from Bogard M, 2011 (PhD thesis).*
STABILITY over time:
*During the year and across years*

- Use of PGRFA diversity *in the same plot* (associated crops and varietal mixtures) and/or *across time* (rotation, cover crops in intercropping, intermediate crops) increases the stability of overall production.

- **Income stability through several products**

- **Widened supply over time**

- **Use of PGRFA Diversity**
  - Reduced cropping systems’ vulnerability to environmental stresses (biotic/abiotic factors)
  - Reduced dependence on external inputs, *greater resilience to external changes*, such as price fluctuations
Conclusions

• Largest possible coverage of existing diversity in *ex situ* collections, access to it and its associated information

• PGRFA diversity used on-farm

• Characterization and evaluation of PGRFA

• Use either directly or through breeding programmes

• Target nutritional value improvements

• Efficient seed systems
Thank you!