Conservation of plant biodiversity for sustainable diets

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Importance of Agricultural Biodiversity

- the source of all our food, and dietary diversity
- mostly held and managed by farmers
- under threat from changes in land use, over harvesting, climate change, “westernization” of diets, loss of local knowledge...

Dimensions of Agricultural Biodiversity

- Genetic resources for food and agriculture: including wild plants harvested and managed for food...
- Components of biodiversity that support ecosystem services
- Abiotic factors
- Socio-economic and cultural dimensions includes... traditional and local knowledge of agricultural biodiversity...

CBD decision V/5
The importance of dietary diversity

• Ensures dietary adequacy
• Increases food security
• Reduces the intake of toxicants
• Protects against chronic diseases
TATRO Women’s Group Case Study

- 3 species recently lost from their food system
  - *Tristemma mauritianum* J.F.Gmel.
  - *Rubus apetalus* Poir.
- An additional 50 species and their use were only known by the oldest members of the group
- TATRO have implemented a seed and knowledge conservation program
Protecting food plant biodiversity

• “counter the loss of diversity in human diets, and in ecosystems, by conserving and promoting … biodiversity for food and nutrition” (cross-cutting initiative, operational objective 3)

• insurance policy

• Readily available source of material for research, re-introduction…
The Millennium Seed Bank

The largest wild plant seed bank in the world

- **120** partners/collaborators in >50 countries;
- **28,000** species duplicated in the MSB;
- Up to **3,318** species with food use;
- >**5200** seed collections distributed for research
Enabling use

Turning seeds into plants: the development of germination protocols

• >14,000 germination tests carried out each year. For most species the methods are new.

• All germination protocols available on Kew’s website

Seed Information Database
Search Results
Storage Behaviour  1000 Seed Weight Germination Literature Cited

APG Clade: EUDICOTS - CORE EUDICOTS - ROSIDS - EUROSIDS II
APG Order: Brassicales
APG Family: BRASSICACEAE
Kew Family: CAPPARACEAE
Genus: Cleome
Species Epithet: lutea
Species Author: Hook.

Germination

1. 78% germination, pre-sowing treatments = seed scarified (chipped with scalp); germination medium = 1% agar + 250 mg/l gibberellic acid (GA3); germination conditions = 23/8°C, 12/12; (RBG Kew, Wakehurst Place)

http://www.kew.org/data/sid
Enabling use

Project MGU - the Useful Plants Project
• Working with 12 communities in 5 countries to provide seeds, plants and propagation protocols.
• Participating communities in Tharaka, Kenya have prioritised 76 food plants.
Enabling Use

Improving the identification, handling and storage of ‘difficult’ seeds

- Regional training workshops in seed handling and conservation
- Dissemination of seed biology information on 160 food species with ‘difficult’ seeds.
Biocultural Evolution of Food

Adaptation
Codes + Strategies = States

Plants
DNA + Physiology = Phyto-chemistry

People
Tradition + Behaviour = Nutrition eaten

Past + Present = Result
Maize

The biocultural advantage in Mexico

Maize  \[\rightarrow\] pH, CaCO\(_3\), MgCO\(_3\), H\(_2\)O  \[\rightarrow\] Niacin  \[\rightarrow\] Protein  \[\rightarrow\] pellagra  \[\rightarrow\] anaemia  \[\rightarrow\] Q protein

The biocultural disadvantage with maize in Africa

Maize  \[\rightarrow\] H\(_2\)O  \[\rightarrow\] Niacin  \[\rightarrow\] Phytate  \[\rightarrow\] Protein  \[\rightarrow\] pellagra  \[\rightarrow\] anaemia  \[\rightarrow\] Q protein
Conclusions

- Agricultural Biodiversity is essential for dietary diversity
- They are both being lost
- Seed banking can complement community based efforts
- Traditional Knowledge plays a vital role