Conservation of plant biodiversity for sustainable diets

Kate Gold, Royal Botanic Gardens, Kew, UK

Rory McBurney, University of Kent at Canterbury, Kent, UK
Bioversity Sub-Saharan Africa

Monica Ouma, TATRO Women's Group, Yala, Siaya Province, Kenya

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
  - *Aframomum angustifolium* K. Schum.
  - *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 scalpel); germination medium = 1% agar + 250 mg/l gibberellic acid (GA3); germination conditions = 23/9°C, 12/12; (RBG Kew, Wakehurst Place)

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

Enabling use

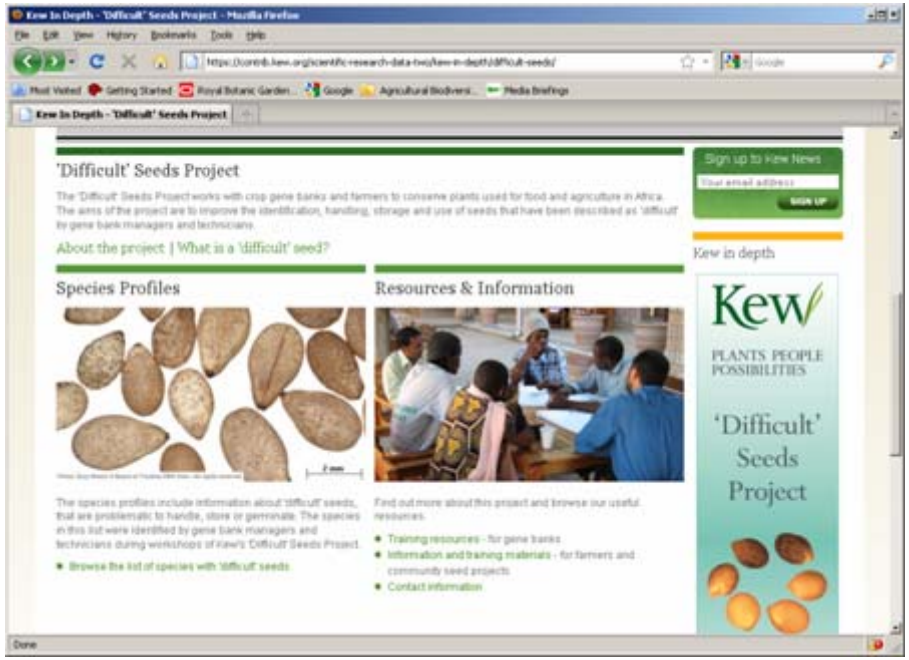
Project MGU - the Useful Plants Project

- 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 + ↑ pH, $CaCO_3$ $MgCO_3$, H_2O ⇒ ↑ Niacin ↓ Phytate ↑ Protein = ↓ pellagra ↓ anaemia ↑ Q protein

The biocultural disadvantage with maize in Africa

Maize + H_2O ⇒ → Niacin → Phytate → Protein = → pellagra → anaemia → 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