DAPA - CIAT
(Decision and Policy Analysis Research Area)

DAPA is one of CIAT’s core areas. Our activities aim to:

- Fully understand the likely impacts of climate change on agricultural systems, livelihoods and critical ecosystem services, and identify best-bet adaptation strategies from local to global level.

- Contribute to improved management of critical ecosystem services through pro-poor payment schemes for water and carbon in Latin America.

- Maximize the impact and returns on investment of agricultural research and development through ex ante and ex post impact assessment.

- Ensure that public and private sector policies provide the opportunity for smallholder farmers to profit from emerging market opportunities.
DAPA’s Main Thematic Areas of Focus

• Climate Change
• Ecosystem Services
• Linking Farmers to Markets
• Socio-Economic Analysis and Impact Assessment
• Gender Analysis
• Capacity Strengthening
Linking climate change, climate analogues and PGRFA

- Climate change threatening centuries of site-specific agricultural development

- **Hotter** (everywhere), **changed rainfall patterns** (most places), and **novel (30%) climates** to be experienced

- Climate projections indicate *increased* climatic interdependence between countries and regions

- **Many adaptation options**, many coming from PGRFA

- Resulting in likely **increase in PGRFA demand**, and increased genetic resource interdependence
Impacts of climate change on wild PGRFA

- **16-22%** (depending on migration scenario) of these species predicted to go extinct (Jarvis et al. 2008)

- **Wild peanuts** were the most affected group, with 24 to 31 of 51 species projected to go extinct

- For **wild potato**, 7 to 13 of 108 species were predicted to go extinct

- **Vigna** was the least affected of the three groups, losing 0 to 2 of the 48 species in the genus
Where do Plant Genetic Resources fit into the adaptation pathway?

1. Access to germplasm
   - Site-specific strategy

2. Improved varieties
   - Breeding strategies
     - Climate Smart management

3. International cooperation
   - Prioritization and planning
   - Germplasm transfer

ENABLING policies
adapted farming systems
raise the BAR

close the GAP
What should we do?

Policy Priorities:

- Conservation
- Sustainable Utilization
- Sharing

Genetic resources that are essential for:

- Food security
- Livelihoods
- Diversification
- Global markets
Case Study (1):
Adapting agriculture to climate change:
Collecting, protecting and preparing crop wild relatives

CIAT participation

OUTPUTS → public domain

Year 1 2 3 4 5 6 7 8 9 10
The aim

- Identifying the current gaps of crop wild relatives (CWR) *ex situ* conserved (for nearly 80 genepools!)

Prioritization results: *Phaseolus* beans case (Ramírez-Villegas et al., 2010)

Identifying richness for priority crops

Our priority gene pools

Total taxa per gene pool

Crop
- Alfalfa
- Apple
- Bambara groundnut
- Banana
- Barley
- Bean
- Carrot
- Chickpea
- Cowpea
- Eggplant
- Faba bean
- Finger millet
- Grasspea
- Lentil
- Oat
- Pea
- Pearl Millet
- Pigeon Pea
- Potato
- Rice
- Rye
- Sorghum
- Sunflower
- Sweet Potato
- Vetch
- Wheat
Advances

• Data → cwr database holding c.a. 4 million records
  – Sources: public available databases (i.e.: GBIF, Genesys, Conabio, CRIA), collaborations with experts (i.e. David Spooner, Nigel Maxted), visits to major herbaria (i.e.: Harvard, Kew, Edinburgh, Madrid)

• Website → www.cwrdiversity.org
  Information on the taxonomy, distribution, conservation status and breeding potential of the wild relatives of major crops.

• Partnerships & collaborations (joint analysis, possible joint publications)
  – Wageningen UR
  – CIP (International Potato Center)
  – ABCIC (Africa)
  – National History Museum - UK
The Caribbean

• We are including in our analysis CWR native to the Caribbean basin, for the following crops:

  – Chili (*Capsicum*)
  – Melon (*Cucumis melo*)
  – Cotton (*Gossypium*)
  – Sweet potato (*Ipomoea*)
  – Cassava (*Manihot esculenta*)
  – Yerba mate (*Ilex paraguariensis*)
  – New cocoyam (*Xanthosoma sagittifolium*)
  – Avocado (*Persea americana*)
  – Pimenta (*Pimenta dioca*)
Case study (2): Analogues for PGR exchange

Analogue sites demonstrate how future climate of a target location will look
• Which species/varieties are used at the analogue sites?
• How can we enable the mutual exchange of genetic material between these sites?

Strengthening national capacities to implement the ITPGRFA*
• Understand changing germplasm needs driven by CC
• Explore PGR gaps and conservation priorities
• Facilitate international cooperation

Map: F. Mer (CIAT-CCAFS)
What should we aim for, more exactly?

Prioritize **genetic resources valuable for food security and livelihoods diversification**

- Fruits
- Root and tuber crops (sweet potato relatives)
- Beans (*Phaseous Lunatus*: resistant to heat and salinity): Cuba, Puerto Rico, Dominican Republic, Antilles, Haiti
- Native cotton
- Plants introduced by Europeans: vegetables, onions, tomatoes, peppers, etc

Identify **genetic resources in the Caribbean with high global value**
- Genetic orphans (have global significance)
- Everything that would be different from anywhere else; one must thus study the variation existing across the Caribbean
- Promote the “rare variants” so that farmers can grow something different from the standard staple (variants of Capsicum, Xanthosoma, Psidium, Bixa and a couple of Sapotaceae)

Photo: Neil Palmer (CIAT)
What should we aim for, more exactly? “Going Back to the roots”

- **Native crops** and WCR (instead of the introduced weeds):
  - Studying the peopling of the Caribbean over the last 10,000 years
  - CWRs that have been present in the Caribbean over the last million years
- Literally focusing on **roots** (more resilient to natural disasters than aerial crops)

Photo: Neil Palmer (CIAT)
What should we aim for, more exactly? (Conservation)

Develop and strengthen **institutions to collect and conserve PGRs**

Develop **low-cost conservation mechanisms**

**Identify risk mitigation strategies:**
- develop repository outside the Caribbean to protect the PGRs against natural disasters
  
*CIAT conserves native cassava from Cuba and species of beans from Haiti*

Photo: Neil Palmer (CIAT)
What should we aim for, more exactly? (Prioritizing and Sharing)

- **Regional linkages**: Caribbean – Central and South America
  
  *young PGRs versus old PGRs*: some species of the latter have already gone through natural selection processes (human and climatic pressure) – we should learn from that!

- Use **climate analogues**: Large pool of PGRFA and associated management practices already available to adapt. They just need to move geographically:
  - Locally (*e.g. technologies and practices*)
  - Regionally
  - Globally
Thank you!

For more information visit our website
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