



GCP Sub-Programme 1: 2005 Commissioned Research Project (2005-2008)

## Tapping Crop Biodiversity for the Resource Poor in East, Central and Southern Africa

**Project PI:** Dave Hoisington, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)  
Morag Ferguson, International Institute of Tropical Agriculture (IITA)

**Project Team:**

ICRISAT: Dave Hoisington, Dan Kiambi, Tom Hash, Santie de Villiers, Rolf Folkertsma  
IITA: Morag Ferguson

National Agricultural Research Systems: Burundi, DRC Congo, Ethiopia, Eritrea, Madagascar, Mozambique, Kenya, Rwanda, Sudan, Tanzania and Uganda

Biosciences east and central Africa (BeCA): Robert Kawuki, Shadia Salih (PhD Students)



Biosciences  
eastern and central Africa

### Introduction

The knowledge of the extent and structure of genetic diversity in germplasm accessions through characterization is essential in understanding the evolutionary trends and also the development of strategies for the conservation of germplasm and its efficient utilization in crop improvement programs. Analysis of data generated through morphological and molecular characterization provides information on responses to biotic and abiotic stresses and also on farmer- and market-preferred traits. The project was developed by the Generation Challenge Program (GCP) and the Rockefeller Foundation in collaboration with Biosciences eastern and central Africa (BeCA), and runs from September 2005 to August 2008. It focuses on two crops, cassava (activities coordinated by IITA) and sorghum (activities coordinated by ICRISAT). It aims to:

- Increase the involvement of NARS from eastern, central and southern Africa in the GCP
- Empower NARS to access and use information made available, particularly through SPI, to broaden the spectrum of crop diversity used in national breeding programs
- Work through the regional crop networks, EARRNET and ECASARM, to promote the sustainable use of standardized methodologies on a regional basis

### Progress

The project inception meeting was held from 15-17 August 2005 in Nairobi, Kenya. Both technical and administrative logistics for project implementation were discussed and agreed upon. Databases for recording passport information were developed. Participants were also trained in the use of Microsoft Access which is being used to document passport information and record phenotypic data. As part of the project's capacity building efforts, two PhD students have been registered at the University of Free State in South Africa and their academic programs are well underway. Phenotyping and genotyping is scheduled for 2006/7 followed by a data standardization and analysis workshop in 2008.

### Sorghum

A project planning meeting was held on 3<sup>rd</sup> April 2006 in Nairobi, followed by a phenotyping workshop held from 4<sup>th</sup>-7<sup>th</sup> April 2006 at KARI, Embu, Kenya. Project partners reviewed progress and agreed to work on a regional composite comprising 1720 accessions representing landraces, farmer varieties and breeders' lines. In the workshop, 27 descriptors representing all the sorghum developmental stages were selected and are now being used in morphological characterization. These are partially derived from the IPGRI descriptor lists for Sorghum.

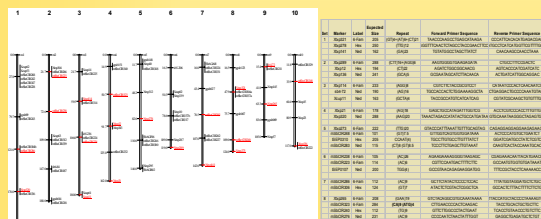


Morphological characterization at the phenotyping workshop

Country	No. of genotypes	Phenotyping sites	DNA extraction	Genotyping	Capacity building
Rwanda	120	Musanze - lowlands Matara - midlands	ICRISAT-BecA, Jan 2007	Feb-April 2007	Visiting Scientist
Eritrea	200	Hamedula - lowlands Hakale - midlands	ICRISAT-BecA, Feb 2007	Feb-March 2007	MSc
Ethiopia	200	Arsenigale - highlands Malena - lowlands	Addis University, Jan 2007	July-Nov 2007	MSc
Kenya	200	Maitani - lowlands Farba - highlands	KARI, Kericho, May 2006	June-Aug 2006	MSc
Rwanda	200	Bwera - highlands Karera - midlands	ICRISAT-BecA, July 2006	Aug 2006	Visiting Scientist
Sudan	400	Wad Madani - lowlands Dharmala - highlands	ICRISAT-BecA, Wad Madani, Aug-Oct 2006	Jan 2007	PhD MSc
Tanzania	200	Banga - highlands Bwema - lowlands	ICRISAT-BecA, July 2006	Aug-Sept 2006	MSc
Uganda	200	Serua - lowlands Pania - highlands	Makerere University, Mar 2007	Apr-June 2007	MSc

Country summaries and schedules

Genotyping will be carried out both at the ICRISAT-BecA facilities and in the Applied Genomics Laboratory in ICRISAT Headquarters. Twenty two SSR markers which are part of the GCP global marker sets have been selected and optimized for genotyping the regional sorghum subset held by NARS in the region.



Location of selected markers (red) in the Sorghum map SSR information for selected markers

- Empower a broader spectrum of stakeholders to link into regional and international research activities
- Initiate an active network of molecular breeders
- Expose NARS germplasm scientists to the facilities and support provided by the BecA platform

The project will achieve these goals by working with NARS partners to characterize and assess the diversity, at both the phenotypic and genotypic levels, of cassava and sorghum germplasm currently used in NARS breeding programs. This includes germplasm resources held within national gene banks, international nurseries and important breeders germplasm. More specifically the project targets the following:

- Designing a database with passport data, farmer-knowledge, pedigrees, phenotyping and genotyping data of target accessions
- Development of standardized phenotypic characterization methodologies
- Phenotypic characterization of target germplasm
- Genotypic characterization of these accessions using SSR markers
- Analysis of diversity at the national and regional levels and its relation with that of the international level by comparison with GCP diversity assessments



PhD students Shadia (left) and Robert (right)



Participants of the project inception meeting

### Cassava

A cassava morphological descriptor list was developed largely from a translation of the descriptor list used by EMBRAPA. This was compared and adapted through comparison with the IPGRI and IITA descriptor lists. A cassava phenotyping workshop was held from 10<sup>th</sup>-12<sup>th</sup> January 2006, in Mtwapa, Coastal Kenya, hosted by the Kenya Agriculture Research Institute (KARI) to partly test and refine the descriptor list. The meeting was attended by twenty one participants from seven countries. As a result of the meeting, 43 descriptors were selected for inclusion in the list. The objectives of the workshop were:

- To review, test and revise the cassava descriptor list
- To provide participants with experience in using the descriptor list in the field
- To standardize as far as possible participants' interpretation of the descriptor list, particularly regarding colour
- To review the passport database and respond to any problems participants were having in using it
- To revisit the work plan for the implementation of future activities



Country	No. of sites	Site replication	genotypes/site	Planting time	Genotyping time
Uganda	2	Yes	270	March - April 2006	July 2007
Kenya	2	No	100	March - April 2006	June 2006
Rwanda	2	Yes	200	November 2006	Early 2007
DRC	2	Yes	200	November 2006	2007
Tanzania	2	No	150	October - November 2006	Early 2007
Madagascar	2	Yes	200	November - December 2006	2007
Mozambique	2	No	??	September - November 2006	2007

Country summaries and schedules

### Acknowledgements

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