

Manihot Genetic Resources:

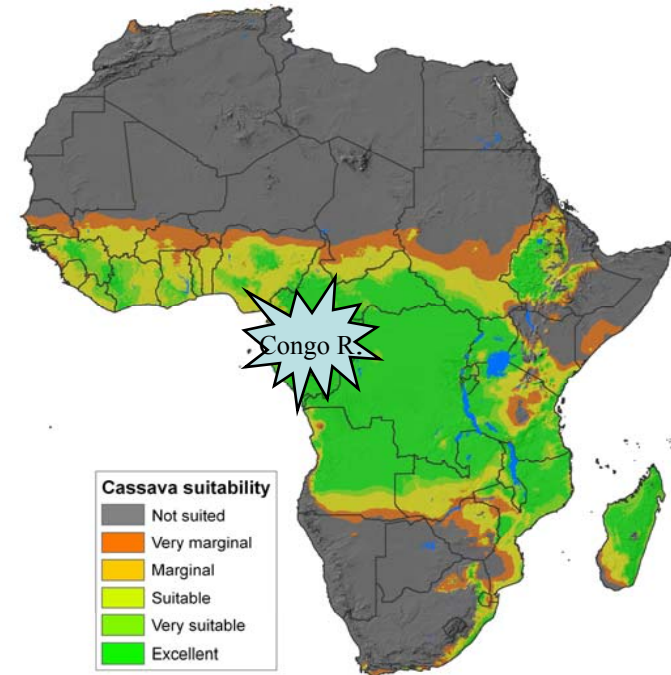
Strategies for long term conservation

Status and needs of cassava germplasm conservation in Africa

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Cassava germplasm entry into Africa

- *First introduced through the Congo River in the 16th Century by Portuguese explorers*
- *Now grown throughout sub Sahara Africa in about 40 countries*
- *Now a major food security crop for millions of Africans but gradually becoming an industrial crop*
- *Africa produces over 50% of total world production*
- *About 75% of Africa's production is harvested in Nigeria, DRC, Ghana, Tanzania, Mozambique, **Uganda and Angola***



Germplasm conservation

<i>Pertinent issues</i>	<i>Status in Africa</i>
<i>Organisation responsible for cassava research</i>	<i>National Agricultural Institutions Universities?</i>
<i>Organisation holding cassava collection</i>	<i>Root and Tuber units under the National Agricultural Institutions</i>
<i>Source of funds for germplasm collection and management</i>	<ul style="list-style-type: none"> ● <i>Government (> 90%)</i> ● <i>Projects - IITA, CIAT, FAO (< 10%)</i>
<i>Legal owner of cassava germplasm</i>	<i>Institutions in charge / Government</i>

** Based on information from > 30 countries*

Germplasm conservation

Human resources for germplasm development in Africa

Availability of human resource and distribution <i>(> 50% time allocation to cassava)</i>	Number	Remarks
1. Breeders	15	Major cassava producing countries
2. Agronomists	25	Major and minor cassava producing countries
3. Germplasm Specialists	3	Nigeria, Malawi and Cote d'Ivoire

Details on cassava germplasm

(NARS survey – 15 countries)

Germplasm Types	Number	% of total collection	Origin of collection
Farmers varieties	1503	42.0%	100% in-country
Breeders/ Experimental varieties	2066	48.0%	44% in- country 46% introduced
Total	3569	100.0%	

Details on cassava germplasm

S/N	Pertinent Germplasm matters	Status in African NARS
1	Period when germplasm was first collected?	<p>1970s and 1980s (In countries with strong root crop NARS and where cassava has long been important - Nigeria, Ghana, Cote d'Ivoire, DRC, Cameroon, Liberia, Uganda, Kenya, Tanzania)</p> <p>1990s and 2000s (In countries with weak root crop NARS or where cassava is becoming important- Benin, Togo, Sierra Leone, Guinea, Gabon, Congo Brazzaville, Mozambique, Madagascar, Angola, Malawi, Central African Rep.)</p>
2	Are there gaps in available germplasm?	<p>There are generally gaps created due to search for :</p> <ul style="list-style-type: none"> -Losses of past collections to natural disasters and wars -Inaccessibility to some major sources of diversity -Logistic problems during past collections -Inexperience and less use of tools for efficient collection
3	Are there plans to fill gaps?	<p>NARS will fill gaps if:</p> <ul style="list-style-type: none"> -Resources are available -Capacity is built and supported

Details on cassava germplasm

S/N	Pertinent Germplasm matters	Status in African NARS
4	In what form is germplasm kept and regenerated?	<ol style="list-style-type: none"> 1. Seeds – Limited to International Centres 2. Vegetative – The most common in African NARS 3. Tissue culture – Less used by NARS but becoming important in - Nigeria, Ghana, DRC, Kenya, South Africa with functional tissue culture labs
5	Field protocols?	<ol style="list-style-type: none"> 1. 10 plants/acc at 1 x 1 m is the most common 2. 10 plants/acc at 1 x 0.5m for large regenerated germplasm 3. >10 plants/acc at 1 x 1m for small germplasm
6	Field quality control measures?	<ol style="list-style-type: none"> 1. Roguing to avoid mixtures 2. Phyto-sanitation 3. Selection of good stems for subsequent establishment



Characterisation and documentation

S/N	Pertinent Germplasm matters	Status in African NARS
1	Is germplasm characterized?	Partially in most NARS
2	Kind of data?	<ol style="list-style-type: none"> 1. Passport: Partial 2. Morphological characterisation: Partial 3. Molecular characterisation: Few NARS have considered this except when financed or handled by IITA or CIAT
3	Commonly characterized traits	<p>Diseases: CMD, CBSD, CBB, CAD, Root rot,</p> <p>Pests: CGM, CM, ARTS, Scale insect</p> <p>Yield and components/plt : No of roots, weight,</p> <p>Root Xtics: shape, peduncle, constrictions, outer and inner skin and flesh colours, ease of peel, peel</p> <p>Root quality: Mealiness, Taste, HCN, DM,</p> <p>Shoot Xtics: Colour of (unexpanded leaf, 1st fully expanded leaf, vein, petiole, stem), pubescence of young leaves, no of lobes, petiole length, anthocyanin distribution, growth habit, height (plant, branch), etc</p>

Characterisation and documentation

S/N	Pertinent Germplasm matters	Status in African NARS
4	Form in which data is available?	<ol style="list-style-type: none"> 1. Excel 2. Hard copy
5	Type of descriptor list used?	Adapted usually from IBPGR with some modifications
6	Plans to computerize?	<ol style="list-style-type: none"> 1. For large collections - Feasible if externally funded 2. For small collections - Feasible with internal funding and Training
7	Are accessions safely duplicated?	<ol style="list-style-type: none"> 1. Generally NO at the NARS level 2. Partial YES for Nigeria, DRC, Ghana, Kenya, Tanzania where in-vitro duplication is on-going (IITA/CIAT) <p>* IITA has duplicated elite germplasm in most African countries.</p>

Plant health at the NARS level

S/N	Pertinent Germplasm matters	Status in African NARS
1	Is collection affected by diseases and pests?	Largely by CMD, CMSD, CBB, CAD, CGM, CM, ARTS, Root rot etc
2	Is virus indexing done before distribution in-country	<ol style="list-style-type: none"> 1. Usually not 2. Phyto-sanitation is sometimes used
3	Is virus indexing done before international distribution?	<p>Yes, however</p> <ul style="list-style-type: none"> • No official direct international distribution by NARS • Indirect international distribution organised through IITA in collaboration with advanced labs in Kenya and S/A



Distribution

S/N	Pertinent Germplasm matters	Status in African NARS
1	Number of accessions distributed in-country in the past 5 years	<ul style="list-style-type: none"> High in Nigeria, Sierra Leone, Ghana, Gambia, Cote d'Ivoire, Guinea, Burkina faso, Benin, DRC, Uganda, Malawi (New varieties released/Presidential Initiatives)
2	Number of accessions distributed internationally	<p>Limited except through Regional Networks and IITA</p> <p>Local varieties now grown internationally include:</p> <ol style="list-style-type: none"> Gbadzekoute: Togo---(Nigeria, DRC, Benin, Ghana) Antiota Nigeria (Benin, Togo, DRC) Tokunbo Nigeria (Gambia, Guinea, CAR) Oko Iyawo Nigeria (Cote d'Ivoire – NESTLE) <p>Others like Precose d'Angola, Kimbandameno - Farmers</p>
3	Will more or less germplasm be distributed in 5 years time	<p>More is expected to be distributed due to:</p> <ul style="list-style-type: none"> Increasing number of farmers and countries adopting cassava for food security and income generation Increasing cassava breeding activities for specific traits and agroecologies with support from AGRA

Restrictions and networks

S/N	Pertinent Germplasm matters	Status in African NARS
1	Are there restrictions to distribution of materials in-country?	Generally not, except in DRC where there are restrictions on materials moving from the west to the east and vice versa due to CBSD and root scale
2	Are there restrictions to international distribution	NARS not yet directly involved in international distribution. CBSD a major set back for import and export of germplasm in and out of East Africa
3	Is there a Network of Germplasm Holders?	Directly no- but indirectly under the canopy of the Root Crop Networks – EARRNET and SARRNET and IITA
4	Is a world-wide network important?	Yes – But must build capacity and develop strong regional and continental arms

Why is Africa important for cassava germplasm matters?

- *A secondary centre of diversity – Has some unique genetic characteristics*

What does Africa have?

- A rich source of diversity for resistance to CMD
- A rich source of diversity for resistance to CBSD
- Multiple disease and pest resistance (CGM, CAD, ARTS, Root rot)
- Genetic adaptation to diverse agro-ecologies and cultural practices
- A rich source of genetic diversity for specific food quality and industrial preferences –TME7 etc

Where are they?

- Some have already been collected and maintained. Many more are endangered in west, central, eastern and southern Africa due to urbanisation, wars, natural disasters, deforestation, **introduction of higher economic value varieties** etc.

Data based information on specific countries is available and GIS can generate more

Needs (*Few but dominant*)

- *Capacity building*
- *Field logistic support*
- *Lab material support*

Matters arising

- What calibre of germplasm merits collection?
- Must every country operate a full germplasm conservation scheme?
- Are there NARS capacities that can be exploited to build regional strengths?
- How do we address the problem of barriers in distribution? – *Integrity and Credibility at this early stage should not be compromised – What role can IAPHSC and AFSTA play?*
- How do we link genebanks for complementarity?

IITA

Research to Nourish Africa

It's okay!!!
Remember I am the one at
risk

