

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 1 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

1. Introduction & Purpose

Collecting is the process of capturing or sampling plant germplasm variability in crops, their wild relatives and related species. Field sampling procedures aim at attaining genetic variation within a species by sampling specific geographical areas at the appropriate time to collect seed, fruits, propagules, tubers or plants. The purpose of collecting is to increase the diversity of the accessions conserved within a genebank collection and thus provide useful materials for breeding, research and restoration.

The National Centre for Genetic Resources and Biotechnology (NACGRAB) as the national genebank does not have mandate crops. All crops including Crop Wild Relatives (CWR) can be targeted for collection by NACGRAB as part of the national mandate. Genetic resources from all geographical areas (North-Central, North-East, North-West, South-East, South-South and South-West) in Nigeria are expected to be targeted for collecting so as to capture the various crop diversity of the country. Collecting of Plant Genetic Resources (PGR) for conservation in NACGRAB engages various sources where crop diversity can be captured which includes wild habitat, low land, high land, plateau, markets and farms. Germplasm categories has no boundaries as it spreads through wild species, cultivars, land races etc. in a bid to fulfil the national mandate of conservation for posterity and utilization.

Collected materials are legally attained in accordance with national and international regulations such as ITPGRFA, CBD/NP access regulations, CITES and phytosanitary/quarantine laws. Material that is collected is transferred via an MTA/SMTA and has proper technical documentation as detailed in MCPD v. 2.1.

Genetic materials, including traditional knowledge, are legally collected and conserved. National laws in collecting are considered including, exploring national parks, import permit, consent of land owner/land managers. Consultation may be required from local communities and land owners. Laws and regulations are considered with regards to access and transfer of materials (Access and benefit sharing agreement and memorandum of understanding). Health, safety and Biosecurity are ensured to be factored into collecting during the planning for exploration of crops or targeted species.

The purpose of this SOP is to ensure consistency in activities related to collecting of genetic resources and compliance with national and international treaties and conventions.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 2 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

2. *Scope*

This SOP applies to the collection of genetic resources and includes the following information:

A. Planning Phase

- Legal considerations:
 - Compliance with national legislation (permits, phytosanitary)
 - Compliance with international legislation
 - Compliance with the International code of conduct for plant germplasm collecting and transfer
 - Clear definition of responsibilities regarding the custodianship and conservation of PGR (agreements, PIC, MAT, SMTA, MTA)
- Partners in the mission (individuals/institution/stakeholders in the exploration)
- Gap analysis, prioritization and strategies for the collecting mission (dependent on species, phenology, access, location, etc.)
- Information to be gathered during the mission
- Checklist for collecting mission (equipment, materials, reagents, first aid, etc.)
- Risk assessment and mitigation for collecting mission
- Financial arrangements for the mission

B. Collecting Phase

- Collecting techniques
- Population assessment
- Phytosanitary considerations
- Labeling
- Data collection
- Herbarium samples
- Transportation (prevention of loss or deterioration of viability/vigour)

C. Post Collection

- Processing of germplasm and its duplicates
- Documentation (PIC, MAT, SMTA, MCPD)
- Post-entry quarantine (Ref. ACQ SOP)
- Introduction to the collections
- Data management

This SOP is used to guide acquisition activities by NACGRAB genebank staff, NACGRAB researchers, other genebanks, National Agricultural Research System (NARS), and other institutions. Please refer to the ACQ SOP for details.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 3 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

3. *Terms, definitions, abbreviations and acronyms*

The following definitions and key terms are pertinent to this SOP:

Accession	A district uniquely identifiable sample representing a cultivar, breeding line or a population, which is maintained in storage for conservation and use.
Active collection	Active collection is composed of accessions which are immediately available for multiplication and distribution for use. It is conserved at 0-4°C and 25% RH.
Base collection	The most original copy of the accessions which are conserved for long-term at -18°C and can be used to replenish the active collection when its genetic integrity is affected and can also be used to assess changes in diversity.
eRH	Equilibrium Relative Humidity
Biological resource	Resources that are not used for their genetic composition, but as an end product or commodity. The rationale for such a broad definition is the experience that compounds used in the pharmaceutical and cosmetic industries are often extracted from agricultural products sourced through intermediaries from local markets at local prices that at times do not reflect the actual market value of the extracted compounds.
Country of origin	the country that possesses those genetic resources in in situ condition
Derivative	A naturally occurring biochemical compound resulting from the genetic expression or metabolism of biological or genetic resources, even if it does not contain functional units of heredity (such as proteins, oils, gums, venoms, and specific compounds such as alkaloids, flavonoids, etc.
Genetic material	any material of plant, animal, microbial or other origin containing functional units of heredity
Genetic resource	
<i>In situ</i> conditions	conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
CITES	Convention on International Trade in Endangered Species of wild fauna and flora
CBD/NP	Convention on Biological Diversity/ Nagoya Protocol
MAT	Mutually Agreed Terms
MTA	Material Transfer Agreement
NARS	National Agricultural Research System
PIC	Prior Informed Consent
SHL	Seed Health Laboratory
SMTA	Standard Material Transfer Agreement
MCPD	Multi Crop Passport Descriptor

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 4 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

4. *Materials, Equipment and Reagents*

Materials:

- cardboard boxes
- Paper envelope (medium size: 160x100 mm; small size: 110x65 mm)
- Cloth bags (60x35 cm, cotton, closure: string)
- Plastic bags (88x50 cm)
- Silica gel

Equipment:

- Global Positioning System (GPS)
- Digital camera (with lateral retractable LCD monitor, and built-in macrophotography)
- One spare memory card of 32 GB (lower capacity not advised)
- Rechargeable batteries (Nickel Metal Hydride) (to be recharged every night, for all equipment with batteries; AA size preferred; have one extra set of four batteries just in case of loss)
- Battery charger (with lighting indicator when charging is complete, and retractable plug)
- Stapler (ACE No. 702)
- Cardboard cutter
- Plastic boxes with waterproof seal (in order to keep newspaper and cardboards dry; size: 60x40x40 cm); transparent walls help see content
- Multiservice knife (e.g. Swiss army knife); if saw included better
- Stainless steel scissors
- Pruning scissors
- Retractable meter (of 3 or 5 meters)

Reagents:

- Sodium hypochlorite solution (5%)
- Methylated spirit

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 5 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

5. *Occupational Health & Safety*

All activities performed in this SOP comply with the requirements and recommendations in NACGRAB Health and Safety Manual.

Genebank dress code for this activity requires the use of Overall coat, safety boot, hand gloves and field head cover.

6. *Procedure*

Collecting is the process of acquiring samples for inclusion in the genebank holdings for medium- and long-term conservation and distribution. The material is legally acquired, represents novel diversity, is of high quality and is properly documented.

A. Planning Phase of the Collecting mission

- 6.1. The collecting procedure is initiated when the genebank staff identifies a potential introduction of material into the genebank collection.
- 6.2. The review process to determine if materials are to be collected lies at the discretion of the head of the genebank and the curators.
- 6.3. The following are key considerations that are determined in the planning phase of the collecting mission:

6.3.1. Legal considerations

- 6.3.1.1. Compliance with national legislation (permits, permissions, phytosanitary)
- 6.3.1.2. Compliance with international legislation
- 6.3.1.3. Compliance with the International code of conduct for plant germplasm collecting and transfer
- 6.3.1.4. Clear definition of responsibilities regarding the custodianship and conservation of PGR (agreements)
- 6.3.1.5. Partners in the mission (individuals/institution/stakeholders in the exploration) includes:
 1. International Institute of Tropical Agriculture (IITA). Ibadan, Nigeria.
 2. National Horticultural Research Institute (NIHORT). Ibadan, Nigeria.
 3. Institute for Agricultural Research (IAR). Zaria. Nigeria.
 4. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Kano, Nigeria.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 6 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

5. Prof. Adeniyi Jayeola. University of Ibadan. Nigeria.
6. Prof. Emmanuel Aigbokhan. University of Benin. Nigeria.
7. Millennium Seed Bank. Royal Botanical Gardens. Kew, United Kingdom.

6.3.2. Gap analysis, prioritization and strategies for the collecting mission.

Gaps are identified by comparing Germplasm and herbarium records to identify gaps in targeted crops i.e. Crop inventory. Information from Herbarium Specimen.

2. GIS Analysis

GIS Analysis is used to identify

- Target areas for species collection – specimens or seeds:
- Areas with a high concentration of species
- Areas with a high concentration of species flowering or fruiting in a certain month
- All areas where native populations are known to occur
- look for species found within a certain distance of a collecting base, particularly endemics or near endemics

3. Ecological Niche Modelling

Ecological Niche Modelling is used to:

- Predicting Species or Habitat Distributions –where else could this species or habitat occur?
- Gap Analysis –what areas have not yet been targeted?
- The effects of Climate Change –predict changes in species distribution and thus areas more at risk
- Endangered–threatened species or habitats
- Endemic–only found in one country or region
- Economically important –
Species valued/used by people for food, medicines, materials, etc.

Other considered priorities include:

- Crop Wild Relatives
- Adapting Agriculture to Climate Change
- Increase Phylogenetic Diversity
- Legumes
- Increase Genetic Representation

Methods for Targeting Species

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 7 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

NACGRAB will discuss and make Collection Guides to make collecting trips more efficient and successful. The aim of the collecting team is to compile as much information as possible, from different sources, about the target species. GIS and Ecological Niche Modelling are not necessary but can be very useful tools in targeting definite species as it supplies useful information which includes:

- Name
- Location
- Date
- Habitat
- Phenology
- Plant Description. What species?
- Where is the population?
- When does it have mature seeds?
- How should it be collected?

6.3.3. Information and material to be gathered during the mission.

Depending on the plan and target of the collecting mission, the team lead is responsible to ensure that propagules (seed and cuttings), Herbarium specimens, Material for DNA analysis, Photographs as well as Field and environmental data (Annex 1) were carefully collected and kept safe for transportation to the genebank as soon as possible. Transporting time depends on the planned number of days for the collecting exercise. Consideration is given to succulent materials to retain quality of collection and protection during transportation to the genebank and post collection (handling during processing).

6.3.4. Checklist for collecting mission

Navigation (Maps, itinerary, GPS)

First aid and safety with kit/box (Who are your First Aiders?)

- Plant identification (Collection guides, floras)
- Collecting and labelling (Bags, jeweler's tags)
- Herbarium specimen preparation (Press, papers)
- Data recording (Standard recording sheets)
- Permits and documents (Letters of authority)
- Target / priority lists ("Handy" field checklists)

6.3.5. Risk assessment and mitigation for collecting mission

Targeting of collecting period that ensure being in the right place at the right time for the priority species collection is an essential part of risk assessment to mitigate against waste of resources. Other risk assessment includes: Logistics, Health, Safety and

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 8 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

BioSecurity: Having the people and equipment that are needed in the field and managing risks is an essential aspect of collecting mission. Final considerations during planning is assessment of:

- The risks of the collecting site
- Rare flora or fauna
- Toxic plants
- Venomous animals
- First aid
- Phone signal

Before setting out on collecting mission check and rechecking information on security and travel advice (i.e. consult other travelers) is give due attention. Plans, Itinerary and participants can be modified if required. Inter health medical clearance and vaccinations is sought if required. Considering logistics for satellite phone should be considered when collecting is planned for remote areas with probable absent of mobile network. Appropriate vehicles will be considered depending on the terrain and capacity to meet the need of the collecting mission.

Team must ensure to minimize the risk of spreading pests and diseases before and after visiting collecting sites. Water and Defra-approved disinfectant should be used for cleaning tools

6.3.6. Financial arrangements for the mission

The collecting mission team lead is responsible for preparing the proposal to the Center Director/Curator on the planned germplasm collecting mission who is in the position to approve and authorize the release of funds for the planned collecting mission. The proposal must contain details of targeted crops, region and areas to explore, material needed and cost of procurement, names and ranks of officer/team members, cost of other logistics as well as duty tour allowances for all collecting team members.

6.3.7. Frequently encountered Permit conditions

When collecting with collaborators/partners Memorandum of Understanding (MOU) to define roles and responsibilities will be signed. The level of involvement will be outlined (i.e. Counterparts will lead/participate in the fieldwork)

- Local communities may need to be consulted
- Permits needed for Federal Government –owned land / National Parks / State /Parks, etc.
- Authorities may send staff to accompany fieldwork

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 9 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

- Sharing and duplication of collected material will be decided during the planning stage (i.e. First set of specimens held in country of collecting and/or Repatriation of part of collection in event of loss.
- Export Permit requirements
- Data sharing (reports, labels, etc.) expected to be provided soon after end of trip / data to be repatriated in the near future

B. Collecting mission

6.4. The following are key considerations during the collecting mission:

6.4.1. Collecting techniques

It is important to make careful observations as a team. The following marks a good team work that will produce remarkable collecting mission.

1. Know your species take your time –be sure
2. Is everyone sure?
3. Avoid mixed collections
4. Seed quality: Physiological state

Seed collecting techniques

- Try to minimize the amount of plant material that is collected. This reduces bulk and makes drying easier.
- Collecting from ground is generally not advisable. Seed may be infested or from the previous year (ageing will have taken place). It may also not be from the target plants.
- In all cases: (1) label bags with tags inside and out (2) ensure they are securely tied, and (3) mark if material is irritant or spiny.

COLLECT SEEDS CLOSE TO POINT OF NATURAL DISPERSAL What signs do we look for?

- Changes in fruit colour
- Changes in seed coat colour
- Fruits splitting or breaking open
- Seeds rattling
- Seeds that are hard and dry
- Some seeds already dispersed

Seed quality: Physical state using cut testing.

Aim for 10,000 seeds but collect no more than 20% of the mature seed available on the day of collection.

Agree on your sampling strategy (Annex 3):

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 10 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

To obtain, in a single population sample, 95% of all the non-rare alleles present in the population (i.e. present at a frequency > 5%). Seed collecting techniques

- Sample initially from the most accessible population •Use either random / stratified random / systematic / biased sampling (record which one used) •Aim for at least 10,000 seeds
- Collect only a maximum of 20% of available seed from the population
- 30 randomly chosen individuals in a fully outbreeding sexual species, or 50 random individuals in a self-fertilizing species i.e. from at least 50 individuals per population.

Agree your collection plan, for example:

1. Remove 5 mature fruits from each individual across the whole population
2. Shake an accessible branch from every third bush alongside the highway
3. Every 2 m across a transect, remove one seed head from the target grass
4. Plucking larger fruits, especially when fleshy
5. Stripping e.g. grasses, branches with many small, dry fruits
6. Pruning e.g. tall trees and shrubs, plants in inaccessible locations
7. Shaking branches fruits that drop when ripe
8. When collecting from ground fruits and seeds already dispersed but BEWARE!
9. Use any tool to help you to make an efficient collection but with Health & Safety caution.

6.4.2. Population assessment.

When you've arrived at your collection site, the following should be assessed:

1. The target species
2. Seed quality –physiological
3. Seed quality -physical
- 4 .Assessing quantity/availability of seed
5. To collect or not to collect?

Return home, disappointed and empty handed? NO!

- Take herbarium specimens to confirm ID
- Record population information
- Return to this population later in the season
- Seek another population
- Assess the next target species

How much money spent to attempt this collection?

Use your time wisely, return home with more knowledge than when you set out

6.4.3. Phytosanitary conditions of the collected samples and hygiene.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 11 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

Insect damage, empty seeds and badly formed are not collected except on rare material and such collection must be tagged, bagged and annotated appropriately to all special handling during transportation and processing.

Phytosanitary conditions of collected samples from outside the country:

- 1-for materials collected in another country, the genebank obtains a phytosanitary certificate from the provider country and an import permit from the Nigeria Agricultural quarantine Services (NAQS) in Nigeria,
- 2- NACGRAB Genebank passes collected samples through the NAQS process before transferring them to the genebank in NACGRAB.
- 3-the genebank in NACGRAB multiplies collected accessions with insufficient seed quantity in containment or in an isolated area, according to the advice of the national phytosanitary authority. Include an image in the SOP of the isolation field or isolation glasshouse.

6.4.4. Labeling of collected samples

Collected samples are tagged with numbers assigned on the data sheet with the jeweler's tag. Team checks the tags are properly fixed before putting the collected materials in appropriate bags (Fig 1).



Fig 1. Collected samples are tagged and bagged.

6.4.5. Data collection

See Annex 2.

6.4.6. Herbarium samples are prepared as shown in Fig 2a and b.



Fig 2a and b. Preparation of herbarium specimen on the field (NACGRAB & MSB)

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 12 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

6.4.7. Containers for seed, cutting and herbarium samples

Cloth bag, net bag and herbarium press are used to collect seeds, cuttings and herbarium samples respectively. Cloth bags and net bags comes with a band to secure the sample inside the bags to avoid sample loss or mix up (Fig 3). The herbarium press comes with a belt to fix samples appropriately to maintain the expected positioning of fixed herbarium specimen.



Fig 3. Collecting Cowpea species with cloth bag

6.4.8. Photographic records of the collecting mission (Figs 4, 5 and 6)



Fig 4a and b. Collecting of sorghum species (North Central Nigeria) and collecting Oryza species (Northwest Nigeria)



	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 13 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

Fig 5a and b. Collecting of Cowpea species (Northwest Nigeria).and collecting and filling data sheet NACGRAB & IAR



Fig 6a and b. Collecting of Solanum species (Southwest Nigeria) and collecting Crop Wild Relative (CWR)

C. Post-Collection

6.5. The following are key considerations during the collecting mission:

6.5.1. Transportation of collected samples. The team lead is responsible to ensure the:

- Prevention of loss or deterioration of viability/vigour)
- Securing of collection
- Immediate post-harvest handling
- Onward travel. Knowing seed eRH at harvest can inform post-harvest handling as Seed longevity halves for every 10% increase in eRH

6.5.2. Processing and cleaning of germplasm and its duplicates,

In-field seed drying methods:

- Ambient drying (sun / shade)
- Silica gel / dried rice / charcoal
- Air-conditioned room

Post-harvest handling of fully ripe seeds must be informed by knowledge of ambient and 'seed' conditions

•Seeds in danger of unacceptable rate of deterioration must be dried as soon as possible using ambient conditions or artificial agents. Premature extraction of seeds and rapid drying leads to poor seed quality as seeds have not developed desiccation tolerance

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 14 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

- Continued maturation of seeds inside detached fruits is possible -keep attached to stems/branches
- Mimicking ambient conditions seems to give best results
- Use all available information, especially cues that seeds are approaching natural dispersal.

Post-harvest handling of fleshy fruits

- Remove seeds from fleshy fruits as soon as morphological signs (e.g. fruit colour) indicate that they are fully ripe.
- Once removed, dry seeds from fleshy fruits slowly under ambient conditions.

Key points

- Initial quality has a significant impact on seed longevity
- Maximum storage potential occurs around natural dispersal
- Use knowledge of seed moisture status and ambient conditions to best handle fully ripe seeds
- Dry seeds at risk of deterioration using ambient conditions or desiccants.
- Premature extraction and rapid drying of immature seeds leads to poor seed quality
- Fleshy fruits should be processed as soon as they appear ripe
- Monitor seed moisture status. Counterparts will lead/participate in the fieldwork
- Local communities may need to be consulted

Frequently encountered Permit conditions

Maximizing Collecting mission

- Collect at near natural dispersal stage
- Keep seeds cool and aerated in the field
- Transfer to seed bank quickly / dry as much as possible in field
- Ripen immature seeds
- Dry seeds to safe moisture levels for long term storage
- Minimizes physical damage during processing

6.5.3.Documentation

PIC, MAT, SMTA, MCPD and all information gathered during the collecting mission, including photographic records are arranged by the collecting team and transferred to the information and documentation unit of the Centre for safe keeping.

6.5.4.Division of samples amongst collecting partners.

Established terms of the partnership includes:

- responsibility for project activities
- rights of use of material and information arising from the project

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 15 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

- financial management
- benefit-sharing and capacity-building activities
- Enables Prior Informed Consent (PIC) i.e. by local government, by national / local authorities

6.5.5. Post-entry quarantine

(In ACQ SOP)

6.5.6. Introduction to the collections

(In ACQ SOP)

6.5.7. Data management

The data manager is responsible for data verification and validation prior to uploading. Please refer to NACGRAB INFMAN SOP

6.6. The collecting procedure is finalized when:

- 1) The material arrives at the genebank and curators initiate the acquisition process (ACQ SOP) in which temporary numbers are assigned and the material is placed in post-entry quarantine and,
- 2) All relevant data and documentation are scanned, verified and uploaded by data managers and curators to the genebank's information management system.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 16 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

7. *Related Documents*

The following **checklists** are used to control the quality of the procedure:

- Checklist for phytosanitary and legal requirements (confirms that phytosanitary and legal requirements are met prior to and during collecting activities).
- Checklist for collecting mission: equipment, materials, reagents, first aid
- Seed Conservation Techniques Training Course (SCT).

The following **workflows** are pertinent to this SOP:

- The collecting flowchart may be considered.

Compliance with standards and policies: Collecting of genetic resources at NACGRAB is in compliance with the following standards

- Policy/Principles on Germplasm Collection
- FAO's Pest Risk Analysis for Quarantine Pests
- FAO's Requirements for Phytosanitary certificates

Adherence to legal and regulatory frameworks: The collection of genetic resources at NACGRAB adheres to the following national and international frameworks:

- ITPGRFA
- Nagoya Protocol
- SMTA
- International Plant Protection Convention (IPPC)
- European and Mediterranean Plant Protection Organization (EPPO)
- WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)
- UPOV
- International Code of Conduct

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 17 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

9. *Staff Training and Competency*

Training and competency requirements to perform this SOP have been met by the following staff:

- Fashola Olutoye Olushola, Plant Genetic Resources Unit, oversight of collecting procedure, genebank activities monitoring and Phytosanitary management
E-mail: sholapearl@yahoo.com
- Anthony Okere, Ag. Director/Curator E-mail: tonnie.okere@yahoo.com
- Adam Olosunde. Plant Genetic Resources Unit. Head Seed Unit. olosundam@yahoo.com
- Olabisi Alamu. Head Extension and Linkages. E-mail: bisialamu@gmail.com

9. *References*

FAO. 2014. Genebank Standards for Plant Genetic Resources for Food and Agriculture. Rev. ed. Rome

FAO. 2022. Practical guide for the application of the Genebank Standards for Plant Genetic Resources for Food and Agriculture: Conservation in field genebanks. Commission on Genetic Resources for Food and Agriculture. Rome.

Bray RA. 1983. Strategies for gene maintenance. In: McIvor JG, Bray RA, editors. Genetic Resources of Forage Plants. CSIRO, Melbourne, Australia. p. 157-168.

Dafni A, Firmage D. 2000. Pollen viability and longevity: practical, ecological and evolutionary implications. Plant Systematics and Evolution 222, 113–132.

Millennium Seed Bank Partnership, Kew. Seed Conservation Techniques Training Course. October, 2015.

New version of Collection Guide. © Copyright 2015, Board of Trustees RBG Kew

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 18 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

10. *Revision History and Frequency*

Effective Date of the SOP	Version #	Description	Reviewed By
30/09/2023	1.0	Original SOP	Anthony Okere
23/11/2023	1.1	Audited SOP	Janny van Beem
02/05/2024	1.2	Edited SOP	Janny van Beem

Revision frequency: the review of this SOP is done on a yearly basis and is part of the staff's work plan and performance evaluation process.

11. *Citation, Copyright and Access agreement*

Citation: NACGRAB. 2024. Collecting genetic resources at NACGRAB (NACGRAB –SOP-COLL-v 1.2.) Contributors: Adam Olosunde, Olabisi Alamu, Femi Ajiboye.

© NACGRAB, 2024

NACGRAB genebank has an explicit Information Access Agreement that defines the terms of use of the information.

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 19 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

Annex I. Sample Pre-data field sheet



FIELD DATA FORM

Please complete all mandatory fields marked in grey with an asterisk (*). Please use BLOCK CAPITAL LETTERS.

Project		Accession No.	
---------	--	---------------	--

COLLECTION DATA

Collected From*	Wild Plants	Cultivated Plants	Donor Organisation
Date Collected*	dd / mm / yyyy		Collection Number*
Main Collector*	name institute affiliated to		
Other Collector(s)	Names & Institutes		

PLANT NAME & IDENTIFICATION DATA

Family*	Identifier's Name		
Genus*	Identifier's Institute		
Species*	Identification (ID) Date		
Intraspecific	rank	species	
ID Status* (circle):	Collector's ID	Provisional ID	Field ID by Specialist
ID From (circle):	Living plant material	Herbarium specimen	Photo
Plant Description* (flower colour, scent, etc.)	Seed		
Plant Form* (circle):	Epiphyte	Forb	Grass
	Erect Herb	Creeping Herb	Climbing Herb
	Animal Food	Bee Plant	Food
	Poison	Environmental Use	Social Use
Uses (circle):	Other:		

LOCATION DATA

Country*			
Province/State	District/Municipality		
Description of Location			
Latitude/Easting*	units	or Grid Ref	
Longitude/Northing*	units	GPS Datum* (e.g. WGS 84)	
Method (circle):	Compiler	Google Map / Earth	GPS
Altitude (m)	Altitude Method (circle):		
	Altimeter	GPS	Map

HABITAT DATA

Habitat*			
Associated Species			
Factors Affecting Habitat (e.g. floods)			
Land Form (e.g. hill)	Soil Type		
Land Use (e.g. farm)	(circle):		
Geology (e.g. basalt)	Other:		
Slope (circle):	0°	1-5°	5-15°
	15-30°	30-45°	>45°
Aspect (circle):	N	NE	E
	SE	S	SW

SAMPLING DATA

Number of Plants Sampled*	Area Sampled (m ²)*	
Number of Plants Found*	% Plants Producing Seed*	
Herbarium Specimen* (tick)	Yes	No
Specimen Sent to Kew	Yes	No
Other Notes		

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 20 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

Annex II. Sample Field Sheet



CWR Project Field Data Form

Collection Number		Collection date		Accession ID	
Main collector surname, first name			Institution (CAPITALS)		
Other collectors names			Institutions		
Family	Genus	Species	Subsp. Var.		
Vernacular name(s) (+ language)					
Photograph IDs or reference numbers					
Herbarium voucher	Yes/No Number:	Number of mature plants found	Number of plants sampled	Sampling method	Seeds / fruits collected from ground?
Soil sample	Yes/No Number:	1000+ 100-999 50-99 25-99	1000+ 100-999 50-99 25-99	Random Regular Transect (linear) Core of population Edge of population Other	Yes No Partially
Sampling area (m x m)		10-24 5-9 2-4 1 If counted actual number	10-24 5-9 2-4 1 If counted actual number	Population distribution Single plant Patchy Continuous	Phenology status More flowers than fruits More fruits than flowers Only fruits Fruits already dispersed
Country		Primary subdivision			
Secondary subdivision		Tertiary subdivision			
Local area		Locality (Including distance and direction from nearest village)			
Latitude		Longitude			Units Degrees Meters
Altitude (m)		Altitude accuracy (m)		Water depth (m)	
Status	Lat/Long method	Altitude method	Prevalent aspect	Slope	Soil texture
Weedy Cultivated Wild	GPS (Datum)	Altimeter DEM GPS Estimate Map	N N-E E S-E S S-W W N-W	Level 0-20° Undulating 20-40° Rolling 40-70° Moderate 70-90° Steep >90°	Gravel Sand Sandy loam Loam Clay loam Clay Peat No soil
Native Introduced Naturalised	Google Earth				Soil pH Acidic Alkaline Neutral Saline Yes Not
Land use			Threats observed		
Habitat and Site Notes (microhabitat details, distance to agricultural crops)			Use (medicinal, firewood, food etc.)		
Collecting Notes (e.g. problems encountered)			Associated species		
Plant Form			Plant Height (m)		
Plant Description (e.g. scents, flower colour, regeneration)					

	Collecting of genetic resources at the National Centre for Genetic Resources and Biotechnology (NACGRAB)		
	SOP Number: NACGRAB COLL SOP v.1.2	Version: 1.2	Page 21 of 21
	SOP Owner: Olutoye, Fashola	SOP Approver: Anthony, Okere	

Annex III. NACGRAB collecting strategy.

NACGRAB Genebank's Collecting Strategy

- 1) The National genebank in NACGRAB in her mandate is responsible to collect all taxa that can be used for food, nutrition, medicine and crop improvement programs. However, priority must be set for a particular well defined taxa by the leading officer of the genebank for every collecting mission
- 2) Inventory and gap analyses must be carried out in a forum that includes every officer of the genebank involved in collecting at the end of each year and it serves as the basis for work plan in collecting for the following year.
- 3) Partners in the mission (individuals/institution/stakeholders in the exploration) includes: International Institute of Tropical Agriculture (IITA). Ibadan, Nigeria, National Horticultural Research Institute (NIHORT). Ibadan, Nigeria, Institute for Agricultural Research (IAR). Zaria, Nigeria, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Kano, Nigeria, and Millennium Seed Bank. Royal Botanical Gardens. Kew, United Kingdom with Prof. Adeniyi Jayeola. University of Ibadan. Nigeria and Prof. Emmanuel Aigbokhan. University of Benin. Nigeria as individual partners.
- 4) When collecting with collaborators/partners Memorandum of Understanding (MOU) to define roles and responsibilities will be signed. The level of involvement will be outlined (i.e. Counterparts will lead/participate in the fieldwork), sharing and duplication of collected material will be decided during the planning stage (i.e. First set of specimens held in country of collecting and/or Repatriation of part of collection in event of loss. And data sharing (reports, labels, etc.) expected to be provided soon after end of trip / data to be repatriated in the near future
- 5) The types of collecting missions that the genebank engages in at a particular period will be determine by the targeted taxa, collaboration and available funds and logistics. These could be multi-species vs species specific, wild vs crop collecting, collecting in farms, markets and natural habitats.
- 6) The key issues that the collecting team addresses are: The target species, Seed quality – physiological, Seed quality –physical, Seed quality –health/phytosanitary, .Assessing quantity/availability of seed, to collect or not to collect?
Return home, disappointed and empty handed? NO, Take herbarium specimens to confirm ID, Record population information, Return to this population later in the season,
Seek another population. How much money spent to attempt this collection?
Use your time wisely, return home with more knowledge than when you set out
- 7) The types of material and data that is expected as outputs of the collecting mission are: seeds, vegetative materials, herbarium samples, photos. Also, see Annex 1 and Annex 2 for list of data that is collected during the collecting mission.
- 8) The broad timeline of the collecting plans in order to ensure best practices and compliance with regulations and requirements ranges from 1 – 14days depending on the targeted taxa.