GLOBAL STRATEGY

FOR

EX-SITU CONSERVATION

OF

SWEETPOTATO GENETIC RESOURCES

Sweetpotato Genetic Resources Conservation – CIP Genebank

November 2007

Table of contents

DISCLAIMER

This document has been developed by the crop experts. The objective of this document is to provide a framework for the efficient and effective *ex situ* conservation of the globally important collections of sweet potato.

The Global Crop Diversity Trust (the Trust) provided support towards this initiative and considers this document as a critical framework for guiding the allocation of its resources. However the Trust does not take responsibilities for the relevance, accuracy or completeness of the information in this document and does not commit to funding any of the priorities identified.

This strategy document is expected to continue evolving and being updated as and when information becomes available. The Trust therefore acknowledges this version dated November 2007.

In case of specific questions and/or comments, please direct them to the strategy coordinator mentioned in the document.

EXECUTIVE SUMMARY

Globally, 36 collections have been identified holding 29,016 accessions of sweetpotato genetic resources. Half (18 collections) include the bulk of the accessions analyzed; the other half correspond to smaller collections, representing 14% of the total accessions. Only 7 collections hold 70% of the total; one third of these is found in the global collection that CIP maintains in its genebank in Peru; the remaining two thirds, are shared by five Asian-Oceanian, one African, and one North American collections.

This proposal on a global strategy for the *ex situ* conservation of sweetpotato genetic resources is based on two major information sources: (1) the analysis of the responses to a questionnaire by collection holders, and (2) a workshop on "sweetpotato global conservation strategy" held in Manila, Philippines, April 30- May 2, 2007. Eighty two percent of the questionnaires were responded, i.e. 18 collection holders from 15 countries; this high response permitted all major sweetpotato collections i.e. with > 500 accessions each, to be included in the analysis of the survey. Additional information was obtained in the Manila Workshop on 18 smaller collections. Consultations conducted at the 2nd international symposium on cassava and sweetpotato, Malaysia, 2005, and from the literature, were also obtained. All contributed to cover in the analysis most of the global sweetpotato *ex situ* collections, and represents over 90% of the accessions reported by FAO (1996).

Sweetpotato collections
The 36 collections analyzed maintain in total 29,016 accessions, including landraces, improved material and wild *Ipomoea* species (Table 1). Only 11 collections hold more than 1,000 accessions each; the largest (>7,000 accessions) in held in CIP genebank, Peru. The remaining 10 collections are distributed one each in South America, North America and East Africa; four in Asia and one in Melanesia (Annex 3 Table 2A). The global collection maintained in CIP, Peru covers at least 49 countries, being 18 the main sources, with Peru and other South American and Caribbean countries (primary centers of sweetpotato diversity) as the most important contributors (Annex 6). All the 36 collections hold landraces, 31 also contain improved materials, but only 6 maintain wild species (Table 1). Most genebanks maintain collections in the field, followed by greenhouse an *in vitro* storage.

Management of collections
Based on the responses to the questionnaires and the Manila workshop discussion outcomes management practices were assessed for the following genebank functions: conservation (field, greenhouse, cold chamber and *in vitro* storage), plant health (pathogen testing and eradication), regeneration of landraces and wild species, characterization (morphological and molecular), documentation and safety duplication, and availability of trained personnel. Most collections showed drawbacks and constraints in functions like plant health, documentation, regeneration and safety duplication. About half of the collections were considered adequate for morphological characterization and field conservation. Most of the low to intermediate assessment rates were assigned to African collections, not so much to Asian collections. The LAC collections showed intermediate to adequate status for most genebank functions except plant health in the case of two collections (Table 3).

Regeneration is a critical genebank function for sustained maintenance of clonal collections, and is linked to the issue of plant health. Sweetpotato regeneration is carried out by root sprouts and vines in field collections. *In vitro* culture is used by 12 collections that have implemented this approach (Annex 5A). Regeneration capacity of genebanks is too low to

support the maintenance of all accessions, either *in vitro* on in the greenhouse; thus in 6 collections 50-100% of their accessions require urgent regeneration. Back logs in seed production have been reported in most of the 6 genebanks holding wild *Ipomoea* species; hence, urgent regeneration is also needed for 20-100% of these accessions (Annex 5B). While plant health is regarded as an important constraint in 2 LAC, 8 African, 2 Asian and 1 Melanesian collections morphological and molecular characterization is also a constraint mainly in African and Asian collections (Annex 7A and 7B). Safety duplication is another genebank function rated as an important constraint by most collection holders, except four genebanks, 1 Latin American and 3 Asian.

Conservation strategy: proposed collaborative actions and support

The assessment conducted of the major constraints and needs facing the collections, allowed the identification of priority collections for upgrading and capacity building (Table 5), as well as those collections with relative higher development (Table 6). This analysis was complemented with the identification of capacity building needs (Annex 8A, B, C), offers (Annex 9) and the role that existing regional networks and partnerships could play. The participants in the Manila workshop outlined a collaborative pre-proposal that integrated five actions to approach the priority issues on sweetpotato conservation analyzed during the workshop.

The collaborative proposal as a "Global Partnership Program on Sweetpotato Genetic Resources" would be implemented through 5 collaborative actions of the program (Annex 10) as follows:

1. Component: Networking
Title: Development of a global network on sweetpotato genetic resources conservation and utilization

2. Component: Documentation
Title 2.1: Capacity building of regional genebanks on database management for sweetpotato genetic resources.
Title 2.2: Upgrading the facilities of priority genebanks for database management for sweetpotato genetic resources.
Title 2.3: Development of a global database network for sweetpotato genetic resources.

3. Component: Regeneration, conservation and safety duplication
Title: Regeneration and conservation safety duplication of sweetpotato genetic resources in Asia, Africa and Latin America.

4. Component: Plant Health
Title: Upgrading capacities to enhance the health status of sweetpotato priority collections

5. Component: Characterization and utilization
Title: Global coordinated program for the characterization and utilization of sweetpotato genetic resources.

To facilitate further development of the pre-proposals, coordinating institutions, focal persons and task forces were appointed by the Manila workshop participants for each one of the five pre-proposal outlines. The strategy also included the existing sweetpotato networks to promote collaborative linkages between the more developed collections with the smaller ones, so that protection of the whole genetic pool of sweetpotato germplasm would be enhanced and, its global availability, promoted. In order to focus the support to the strategy by the Trust

and other potential sources, urgent genebank function constraints have been incorporated as key components of the collaborative actions in the pre-proposal outlines.

1. Strategy Development Processs

1.1 Coordinator

William Roca, Centro Internacional de la Papa (CIP)
Apartado 1558, Lima 12, Perú, Tel. 51-1-3496017
Email: w.roca@cgiar.org
With:

- Genoveva Rossel Montesinos, Centro Internacional de la Papa (CIP)
  Apartado 1558, Lima 12, Perú, Tel. 51-1-3496017
  Email: g.rossel@cgiar.org

- Dindo Campilan, UPWARD
  PCARRD Complex, Timugan, Los Baños, Laguna, Philippines
  Tel. 63- 49-536818
  Email: d.campilan@cgiar.org

1.2 Contributors

Brigitte Laliberté, Global Crop Diversity Trust, Rome
Email: b.laliberte@cgiar.org

Daniel Renoso, INIA, Lima, Perú
Email: dreynoso@inia.gov.pe

Ramanatha Rao, Bioversity International
Doral Eshon, Malaysia
Email: v.rao@cgiar.org

Hidelisa de Chavez, UPWARD
PCARRD Complex, Timugan, Los Baños, Lagune, Philippines
Email: h.dechavez@cgiar.org

1.3 Experts consulted

Twenty eight sweetpotato collection curators, breeders and scientists from globally and regionally relevant sweetpotato collections and other organizations working with sweetpotato genetic resources, from 20 countries of Latin America and the Caribbean, North America, Asia, Africa and Melanesia.

2. Purpose and objectives of the strategy

Purpose
Contribute towards the development of an efficient and effective sweetpotato global *ex situ* conservation strategy.

Objectives

- To assess the status and identify priority needs and constraints of sweetpotato collections with reference to critical genebank functions; and urgent upgrading and capacity building requirements.
- To promote collaboration between relevant holders of sweetpotato genetic resources, regionally and globally.

3. Expected outputs

- An assessment of the status of sweetpotato collections of most importance, regionally and globally, considering its primary and secondary centers of diversity.
- A regional assessment of sweetpotato collections that are more developed in terms of size, extent of diversity, holdings of wild relatives and other quality standards.
- A regional assessment of collections requiring capacity building and upgrading.
- A pre-proposal for a global strategy, based on the principles of collaboration and sharing of coordination responsibilities, facilities and tasks, which will result in the rationalization of conservation efforts at regional and global levels.

4. Strategy approach and activities

This draft global strategy development has been prepared in collaboration with the Global Crop Diversity Trust Secretariat, and in consultation with representatives of relevant organizations, sweetpotato experts, collection managers, and members of regional networks, worldwide. The following activities to develop this draft global strategy have been carried out:

1. Contacts were established with sweetpotato experts, collection holders and networks:
   - Consultation during the 2nd International Cassava and Sweetpotato Symposium, 13-17 June, 2005, Kuala Lumpur, Malaysia.
   - Briefing during the 14th Triennial Symposium of the ISTRC, 20-26 November, 2006 Kerala, India.

2. Basic information and relevant data of major collections was gathered through:
   - Using relevant databases, reports and other sweetpotato resources.
   - A questionnaire distributed to 22 sweetpotato germplasm curators, including national *ex - situ* collections, networks and the global collection at CIP, in Latin America and the Caribbean, North America, Asia, Africa and Melanesia. The questionnaire included consultations on details of the sweetpotato collections, their management, type and quantity of germplasm held, utilization, informatics, networking and policy issues (see Annex 1A and 1B).

3. Analysis of the compiled data prior to the Manila workshop, which included: general reference information of the collections, composition and size, germplasm acquisitions, characterization, regeneration, evaluation and documentation; storage methodologies, and health status of the collections, distribution to users, major constraints and gaps

4. Organization of an "International Consultative Workshop on Developing a Global Strategy for *Ex situ* Conservation of Sweetpotato Germplasm" with key stakeholders of the most important germplasm collections, and selected experts identified in each region. The workshop was organized in collaboration with UPWARD-CIP in Manila, Philippines, April 30- May 2, 2007 (see Annex 2A and 2B).

5. Identification of collections and sets of accessions of major importance for a rational global system of sweetpotato conservation. Collection size and diversity, uniqueness of the material, type of material (landraces, wild relatives, genetic stocks, etc) were utilized as criteria for the analysis.

6. Assessment of the status of collections identified: information systems and data, regeneration, plant health, storage/maintenance methods, safety duplication and distribution.

7. Identification of priorities for capacity building and facilities and upgrading needs.

8. Assess options for collaboration, sharing of responsibilities and potential for providing services in the conservation of sweetpotato germplasm at regional and global level.

9. Identify and develop specific themes of collaboration with the Trust in the conservation of sweetpotato germplasm at regional and global level. Identify regional and thematic task forces to work on pre-proposals.

10. Development of the global strategy for the conservation of sweetpotato germplasm.

5. State of the Art of Sweetpotato Conservation

5.1 The sweetpotato crop

Names: Sweetpotato (English); batata, boniato, camote (Spanish); Kumara (Polynesian); Viazi vitamu (Kiswahili) Sweetpotato is a tropical perennial, cultivated as an annual in temperate climates; grown in more than 100 countries. It ranks on the world's seventh most important food crops. More than 133 million tons are produced globally per year. Asia is the world's largest sweetpotato producing region, with 125 million tons/year; China with 117 million tons/year accounts for 88% of world production. African farmers produce only about 7 million tons of sweetpotato annually, but in contrast to Asia, most of the crop is grown for human consumption (Collins, 1998; CIP, 2007).

Sweetpotato is cultivated primarily for the enlarged edible storage roots which provide high amounts of starch, and in some countries tender leaves are consumed as vegetable. Mature vines are also fed to livestock, especially dairy cows and pork fattening. Over 95% of the global sweetpotato is produced in developing countries where it is a staple or alternative style food. Hundreds of cultivars and landraces are grown, and many are unique to countries or smaller regions within countries (Collins, 1998).

5.2 Sweetpotato taxonomy, origin and distribution

Sweetpotato *Ipomoea batatas* L. (Lam.), and its wild relatives, are members the family Convolvulaceae. The genus includes 600-700 species of which sweetpotato is the only one cultivated. More than 50% are in the Americas. Sweetpotato and 13 wild *Ipomoea* species closely related to sweetpotato belong to the section Batatas; all of these, except *I. littoralis* are endemic to the Americas (Huaman and Zhang, 1997).

It is still under discussion whether sweetpotato is an autopoliploid derived from the wild species *I. trifida* or an allopolyploid involving *I. trifida* (diploid) and an unidentified tetraploid parent. (Collins, 1998), whose genome would be: B_1 B_1 B_2 B_2 B_2 B_2. But the important point is that, as a highly heterozygous, poliploid, species vegetative propagation plays a major role in sweetpotato diversity, conservation, improvement and agriculture.

Sweetpotato seems to be an hexaploide (2n=2x=90), whose basic chromosome number is x=15. The wild *Ipomoea* species related to sweetpotato can be diploid through hexaploid; thus,

I. littoralis and *I. tiliacea* are tetraploids; the other species are diploid (2n=2x=30), but *I. trifida* can include from 2x through 6x plants (Huaman, 1992).

Following domestication, probably in the lowlands of Northwestern South America to Central America (Austin, 1977), three possible routes of dispersal have been proposed (Woolfe, 1992):

(i) the "batatas" route starting right after 1492 with introductions into Europe and continued after 1500 from Europe to Africa, India and the Eastern Islands;
(ii) The "kamote" route where the Spanish carried clones from Mexico to the Philippines; from here sweetpotato was probably taken to China by the end of 1500's;
(iii) The pre- Magellanic introduction of sweetpotato (the "kumara" route) into Polynesia, either by Peruvian or Polynesian travelers.

5.3 Sweetpotato reproduction

Ipomoea batatas is an open pollinated, mostly self-incompatible species; pollination is carried by insect vectors. Cross-ability barriers have been identified including scarce natural flowering, saprophytic incompatibility and partial sterility. Sweetpotato's high heterocygosis is maintained through vegetative propagation using stem cuttings or vines and root sprouts. Meristem and shoot tip culture have now become a proposed method for vegetative reproduction, storage and distribution of sweetpotato germplasm (Panta, et al. 2007). While seed production can occur readily in the wild *Ipomoea* species, landraces present important constraints; thus open pollination can be practiced as long as insect vectors, e.g. bees, are incorporated (Iglesias, A.C. 2006).

5.4 Information sources for assessing the state of the art of sweetpotato conservation

Two major sources of information were utilized for assessing the state of the art of sweetpotato conservation at the global level:

(i) Analysis of the 18 responses to the questionnaire.
(ii) Analysis of additional information provided by national and regional participants in the Manila workshop, May 2007.

Copies of the questionnaire were sent to 22 contacts (sweetpotato curators/collection holders) in 18 countries. Eighteen genebank contacts, from 15 countries, returned completed questionnaire (82%), which is considered a very high response. These 18 genebanks hold approximately 88% of the global total sweetpotato accessions.

The Manila workshop was attended by sweetpotato genetic resources networks from Asia and Africa, who provided information regarding 18 smaller collections, specially from Africa and Asia. With this addition, over 90% of the global total sweetpotato accessions (FAO, 1996), was achieved in this analysis.

The data obtained from the 18 completed questionnaires was compiled into 14 Tables (Table 2A; Annex 3: Tables 1-14), involving 18 larger sweetpotato collections; 2 more Tables completed the information with the data of smaller collections from Africa and Asia (Table 2A; Annex 3: Tables 15 and 16).

The information obtained from the questionnaires and the Manila workshop was enriched by published information.

5.5 Assessment of sweetpotato collections

5.5.1 Conservation and size distribution of collections

This analysis was done on 36 collections from 32 countries of 5 regions (Table 2A): Latin America and Caribbean (LAC), North America, Africa, Asia and Melanesia (Annex 3: Tables 2A and B). In total, the 36 collections contained 29,016 accessions including landraces, wild species and improved material. Landraces are the majority (18, 470 accessions = 64%); landraces are present in the 36 collections, followed by improved varieties and breeding lines present in 31 collections, and the wild *Ipomoea* species, which form the smallest group, are limited to 6 collections. Based on recent work at CIP, however 45-50% redundancies, at accession level within collections, can be expected, in the landraces.

The distribution of the 29,016 accessions is not uniform among collections nor regions. Only 10 collections, out of the 36, hold 1,000 or more accessions each, with the largest (>5,000 accessions) held in CIP genebank; and the remaining 9 collections which hold between 1000 – 4,999 accessions each, are present, one in each region, except in Asia, which has 5 collections (Table 2B). Fifty percent (18) of the collections hold 100 - 999 accessions each, and are located mostly in Africa (10) and Asia (7); and 5 collections located mainly in Africa hold less than 100 accession each (Tables 2A and 2B). Thirteen collections contain more than 80% of the total accessions of the 31 collections. On a regional basis, close to half of the 29,016 accessions are maintained in 14 collections from Asia, one third in 4 LAC collections, and about one seventh of the accessions are in 14 African collections. If regions are ranked by the average size of collections, LAC comes first with 2,400 accessions per collection; then, North America and Melanesia with over 1,000 accession each then Asia, and finally Africa.

Table 1. Overall composition and size of the sweetpotato collections included in this assessment.

Numbers	Wild species	Landraces	Improved material (***)	Total (*)
No. species	162	1	-	163 (**)
No. of holding collections	6	36	31	36
No. accessions	1,948	18,470	8,598	29,016

(*) All collections contain landraces; most contain improved material and breeding lines; and only few contain wild species.
(**) Degree of redundancy of species in different collections requires an assessment.
(***) Includes: improved varieties and breeding lines.

Table 2A. List of collections assessed and number of accessions by region

Region/Collection/Country (*)	No.accessions		
	Wild	**Cultiv.**	**Total**
LATIN AMERICA & CARIBBEAN			
1. CIP, Lima, Peru (PER)	1,160	6,360	7,520
2. INTA, Castelar, Argentina (ARG)	122	362	484
3. EMBRAPA, Brasilia, Brazil (BRA)		1,024	1,024
4. INIVIT, Sto. Domingo, Cuba (CUB)	95	535	630
Sub-total	**1,377**	**8,281**	**9,658**
NORTH AMERICA			
5. USDA/ARS, Georgia, United States (USA)	447	755	1,202
Sub-total	**447**	**755**	**1,202**

ASIA			
6. CIP/ESEAP, Bogor, Indonesia (IDN)		1,366	1,366
7. IABIOGRI, Bogor, Indonesia (IDN)		1,520	1,520
8. Philrootcrops, Leyte, Philippines (PHL)		801	801
9. IAS, Xuzhou, China (CHN)	40	1,044	1,084
10. MOKPO, PR Korea (PRK)		497	497
11. VASI, Hanoi, Vietnam (VNM)		480	480
12. NPGRL, Los Baños, Philippines (PHL)		183	183
13. NIAS, Tsukuba, Japan (JPN)		1,600	1,600
14. ICAR, Kerala, India (IND)	84	3,778	3,862
15. NPRCTC, Benguet, Philippines (PHL)		180	180
16. MARDI, Selang, Malasia (MYS)		72	72
17. PHRC, Thailand (THA)		236	236
18. CARI, Sri Lanka (LKA)		131	131
19. South Korea (KOR)		430	430
Sub-total	**124**	**12,318**	**12,442**
AFRICA			
20. FIFAMANOR, Antananarivo, Madagascar (MAG)		98	98
21. NACRRI, Kampala, Uganda (UGA)		1,808	1,808
22. CIP/SSA, Kabete, Uganda (UGA)		141	141
23. INERA, Mulungu, Republic of Congo (COD)		120	120
24. KARI, Kumasi, Ghana (GHA)		167	167
25. Univ. Ibadan, Ibadan, Nigeria (NGR)		90	90
26. Mpnza Res. St., Zimbawe (ZMB)		258	258
27. ARI, Mzuzu, Malawi (MWI)		139	139
28. IIAM, Umbeluzi, Mozambique (MOZ)		102	102
29. VOPI, Pretoria, South Africa (ZAF)		444	444
30. ARI, Mazozo, Angola (AGO)		34	34
31. EARI, Awasa, Ethiopia (ETH)		319	319
32. KARI, Kakamega, Kenya (KEN)		120	120
33. HORTI, Tengeru, Tanzania (TNZ)		584	584
34. ISAR, Rubona, Rwanda (RWA)		159	159
35. INIDA, S.J. Orgaos, Cape Verde (CPV)		11	11
Sub-total	**0**	**4,594**	**4,594**
MELANESIA			
36. NARI, Kainantu, Papua New Guinea (PNG)		1,120	1,120
Sub-total	**0**	**1,120**	**1,120**
TOTAL	**1,948**	**27,068**	**29,016**

(*) Data of 18 collections: 1-5, 6-15, 20-21 and 36 were obtained from the survey's questionnaires and make a total of 25,459 accessions; the remaining 18 collections are from the Manila workshop and make a total of 3,557 accessions

Table 2B. Number of sweetpotato collections holding a given range of accessions in each region

Range of accessions	LAC	North America	Africa	Asia	Melanesia	Total
> 5,000	1	0	0	0	0	1
1,000 – 4,999	1	1	1	5	1	9
500 – 999	1	0	1	1	0	3
100 – 499	1	0	10	7	0	18
<100	0	0	4	1	0	5
Total No. collections	4	1	16	14	1	36
Total No. accessions	**9,658**	**1,202**	**4,594**	**12,442**	**1,120**	**29,016**

5.5.2 Accessibility and availability of collections

The great majority of collections analyzed are held by governmental organizations such as national agricultural research institutions. The CIP collection is held under international legislation and maintains the global collection of sweetpotato genetic resources (Annex 4).

In term of access, 18 countries, where 22 collections are located, have ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (IT); other 8 countries have not ratified the IT, and 6 have not a defined status with respect to the IT (Annex 3: Tables 2A and 2B).

CIP, as part of the CGIAR mandated collections, has signed an agreement with the government body of the IT, hence the collection is freely available under the provision of a standard MTA; the MTA includes articles on access and benefit sharing (FAO, 2002). The 14 collection holders whose countries have not yet ratified the IT, expressed interest to use the interim "Solemn Undertalking" provided by the Trust.

5.5.3 Recent germplasm acquisitions and future collecting

Collection holders provided information in the questionnaire on acquisition and future collecting. Thirteen out of the 18 larger genebanks acquired only 1,041 accessions in the last 10 years; most acquisitions were for improved material, followed by landraces. While 13 genebanks recognize the existence of geographic and trait gaps in their collections, only few considered the wild species as a gap. Expansion of collections over the next 5 years included collecting missions in 13 genebanks, with and expansion rate of 5 - 10% (Table 3, Annex 3).

5.5.4 Overall status of collections

Based on the responses to the questionnaires and the Manila workshop discussions, the 36 collections were rated as low, intermediate or adequate for six genebank function criteria: conservation, plant health, regeneration, characterization, documentation and availability of trained personnel (Table 3).

The status of 31 collections were rated “low to intermediate” for plant health; the same rating received 26 collections for documentation (i.e. computerized databases), and 28 for regeneration. On the other hand, 11 collections were "adequate" for characterization (i.e. morphological) and 10 collections obtained the same rate for conservation (Table 3).

The analysis by region shows that most collections with "low to intermediate" status rate were in Africa, e.g. 16 collections for plant health, documentation, characterization and regeneration; and 15 for conservation. This trend was followed in number by the Asian

collections. However, the LAC collections were “intermediate to adequate” for most genebank quality criteria, except three genebanks which were rated "low to intermediate” for plant health and characterization. Regarding the availability of personnel, the three quality criteria “low, intermediate and adequate” were evenly distributed in terms of the number of collections (Table 3).

Table 3 Overall status of sweetpotato collections for key genebank functions: collections rated low=1, intermediate=2, or adequate=3

Collection /Country (*)	Conservation	Plant health	Regeneration	Characterization	Documentation	Personnel
LATINAMERICA AND CARIBBEAN						
1. CIP (PER)	3	3	3	3	3	2
2. INTA (ARG)	3	2	2	3	3	1
3. EMBRAPA (BRA)	3	2	2	3	3	1
4. INIVIT (CUB)	2	1	2	2	2	ND
NORTH AMERICA						
5. USDA/ARS (USA)	3	3	3	3	3	3
ASIA						
6. CIP/ESEAP (IDN)	3	2	3	3	3	2
7. IABIOGRI (IDN)	2	12	2	2	3	3
8. PhilRootcrops (PHL)	2	2	ND	3	3	ND
9. IAS (CHN)	3	2	ND	3	2	3
10. MOKPO (PRK)	1	1	ND	1	1	3
11. VASI (VNM)	2	1	1	1	1	2
12. NPGRL (PHL)	2	2	1	1	2	1
13. NIAS (JPN)	3	3	3	3	3	3
14. ICAR (IND)	3	ND	2	3	3	ND
15. NPRCR TC (PHL)	2	1	1	3	2	2
16. MARDI (MYS)	2	2	2	2	2	3
17. PHRC (THA)	2	1	2	1	2	2
18. CARI (LKA)	2	2	2	1	2	2
19. S. Korea (KOR)	3	2	3	3	3	3
AFRICA						
20. FIFAMANOR (MAG)	2	1	1	2	1	1
21. NaCRRI (UGA)	2	2	2	2	2	2
22. CIP/SSA (UGA)	2	2	2	2	2	2
23. INERA (COD)	1	1	2	1	2	2
24. KARI (GHA)	1	1	1	2	1	2
25. Univ. Ibodan (NGR)	2	1	1	2	2	2

26. Monza (ZMB)	1	1	1	2	2	1
27. ARI (MWI)	2	2	1	1	1	3
28. IIAM (MOZ)	2	1	1	2	2	1
29. VOPI (ZAF)	2	2	1	2	2	
30. ARI (AGO)	2	1	1	2	1	1
31. EARI (ETH)	2	2	2	1	2	1
32. KARI (KEN)	3	1	2	2	2	2
33. HORTI (TNZ)	2	1	2	2	2	1
34. ISAR (RWA)	1	1	2	2	1	3
35. INIDA (CPV)	2	1	1	2	1	1
MELANESIA						
36. NARI (PNG)	2	1	1	2	2	1

(*) Data of 18 collections: 1-5, 6-15, 20-21 and 36 were obtained from the survey's questionnaires and make a total of 25,459 accessions; the other 18 collections are from the Manila workshop and make a total of 3,557 accessions

5.5.5 Regeneration of accessions

Regeneration is a critical genebank function to maintain accessions viable for utilization. A high regeneration standard contributes to the collections' long-term viability and to add effective value to users. Good regeneration practices are especially relevant for the management of clonal collections, such as the sweetpotato landraces. Table 3 shows that the status of regeneration of most collections is "low to intermediate". The 36 collections analyzed here include field maintenance as part of the conservation modalities. Pests and diseases threat the survival of these collections; for example, 15 of the collections reported symptoms of virus infection, and 8 recognized the damage to field accessions. Similarity, CIP recently reported 26 % of 744 accessions from Peru infected with 8 viruses, including the Sweetpotato Feathery Mottle Virus (SPFMV), and the Sweetpotato Chlorotic Stunt Virus (SPCSV). Other collections, like the ICAR from India reported weevil, viral and fungal attack in the field collection. The Chinese collections at Xuzhou pointed out the occurrence of nematodes, rots (root and black) wilts (fusarium and bacterial) as well as the sweetpotato virus complex. Under these conditions, maintaining high regeneration standards becomes a difficult and costly task. To minimize or avoid the risks associated with the field maintenance of collections, several genebanks have implemented greenhouses and/or *in vitro* methods for the conservation of sweetpotato landraces.

More than 12,000 landraces are maintained *in vitro* and/or in the greenhouse of 12 collections in the 5 regions (Annex 3, Table 9). Potential capacity for regeneration varies greatly among the 12 collections; this capacity is too low in collections to support the maintenance of all accessions, either *in vitro* or in the greenhouse, e.g. capacity of the NPGRL collection from Los Baños, Philippines, is only 50 accessions per year; other collections, in contrast revealed sufficient regeneration capacity, e.g. INTA, Argentina, with 250 *in vitro* accessions per year; and the global collection at CIP: 3,850 *in vitro* accessions and 2,600 greenhouse accessions per year. From the 12 collections, 6 collections recognized that 50 – 100% of their accessions require urgent regeneration (Annex 3: Table 9, and Table 5A).

Only 6 out of the 36 collections assessed maintain wild *Ipomoea* species, in addition to the landraces. Conservation of wild species is by means of botanical seed. Seed is collected from self-pollinated mother plants grown in the greenhouse. Because of variability in seed production, the issue of seed availability is important in the management of wild species. Since dried seed can be stored at 18° to 20° C below zero for many years, without loosing viability

significantly, the potential regeneration capacity reported by 6 genebanks seems adequate for maintaining viability on the long-term. However backlogs in seed production have accumulated over the last two decades in most of the six genebanks. For this reason, prompt regeneration is required for 20-100% of the accessions (Annex 5 B).

5.5.6 Composition and coverage of the global and national collections

CIP has taken the global mandate for sweetpotato within the CGIAR centers. Currently the global sweetpotato collection held in CIP genebank comprises over 7,500 accessions, including 4,383 *I. batatas* landraces, 1,160 accessions of 67 wild *Ipomoea* species including, 11 species of the series Batatas, and over 1,970 improved materials, including varieties and breeding lines (Annex 3: Table 2A).

In addition, CIP contributes to the maintenance of 1,366 sweetpotato accessions, mostly landraces, in Indonesia, and 141 accessions including 34 landraces in Uganda. The sweetpotato collection held in CIP genebank is part of the Annex 1 list of crops of the multilateral system under the IT. The collections cover at least 49 countries, with 18 as the most important contributors in term of accessions (> 20 per country). This collection constitutes the largest sweetpotato collection worldwide. Peru is the largest contributor with more than 2,500 accessions, followed by Western Africa (877 acc.), the Caribbean (520 acc.), Papua New Guinea (448 acc.); then Argentina, Colombia, Taiwan and Ecuador (Annex 6). However representation from at least 12 Eastern African countries and 10 Asian countries is very low. With the exception of *I. trifida*, the *Ipomoea* wild species of the series Batatas is represented in the CIP collection as well as in the USDA/ARS, EE.UU and the Xuzhou collections, China (Table 4).

Table 4. Representation of wild *Ipomoea* species in five sweetpotato collections.

Wild *Ipomoea* Species	CIP, Global (PER)	USDA/ARS (USA)	Xuzhou (CHN)	INTA (ARG)	ICAR (IND)
I. cardatotriloba	X	X	X	X	
I. cynauchifolia	X	X	X		
I. grandifolia	X	X	X	X	
I. lacunose	X	X	X		
I. x*leucantha*	X		X		
I. littoralis		X			
I. ramosissima	X	X	X		
I. tabascana	X	X	X		
I. tenuissima		X	X		
I. tiliacea	X	X	X		
I. trifida	X	X	X		X
I. triloba	X	X	X		
I. umbraticola	X	X	X		
Total: 13 spp.	**11/13**	**12/13**	**12/13**	**2/13**	**1/13**

Besides, the global sweetpotato collection held at CIP, several national collections also show important coverage of landraces. The IABIOGRI collection from Indonesia includes a good regional representation: 132 accessions from Bali, 156 from Nusa Tengarara, 241 from Sulawesi, 550 from Papua and 32 from other islands. The HORTI, Tengeru, collection from Tanzania includes 90 accessions from Tengeru itself, 80 from Ukiriguru, 23 from Uyole and 74 from Kibaha. In addition to local material, other collections such as the PhilRootcrops from the Philippines includes 170 foreign accessions; the NPGRL and NPRCTRC collections of the

Philippines include 19 and 3 foreign accessions, respectively. The IAS, Xuzhou collection from China includes 222 foreign varieties.

Further phylogenetic, morphological and molecular, analyses of these collections will be needed to help identify homologous genetic material, leading to the clustering of potentially redundant landraces. CIP strategy for the management of redundant accessions, consists in converting the homologous morphological groups into botanical seed, through open pollination, for long-term storage; one representative clone from each cluster is maintained *in vitro* and/or in the greenhouse (Iglesias, 2006)

6. Towards a Rational Sweetpotato Conservation Strategy

The strategy development was based on the analysis of the responses to the questionnaires and the discussions in the Manila workshop. Further, consultations and a review of the available literature also contributed. With this base line information and data, the following evaluations were carried out:

(i) major constraints of individual sweetpotato collections were identified,
(ii) the needs of individual collections were identified for major genebank functions; using the above information,
(iii) sweetpotato collections were selected for priority capacity building and upgrading; and
(iv) identification of the sweetpotato collections of relative higher development.

This analysis was complemented with:

(v) the identification of capacity building offers and,
(vi) existing collaborative arrangements, such as networks and partnerships.

6.1 Support for the strategy

To develop a focused strategy in the identification of support from the Trust and/or other funding sources, participants in the Manila workshop were requested to brainstorm and workout potential themes and specific project pre-proposal outlines, which would incorporate most of the priority issues and constraints to major genebank functions. Therefore, efforts to support the urgent priorities in sweetpotato conservation could be managed through the whole collaborative proposal, or through any of its five project and action, components (see items 7 and 8, below).

6.2 Needs and constraints of sweetpotato collections

6.2.1 Major constraints of individual collections

This analysis will lead to the identification of collections requiring capacity strengthening and upgrading. The data generated from the questionnaires and the Manila workshop allowed to rate the needs and constraints of 31 collections. This was done on the basis of whether they faced or not major constraints to carry out the following functions: storage, regeneration, plant health, characterization, documentation and safety duplication (Annex 7A and 7B).

The LAC and North American collections (5) did not report constraints to carry out the functions: storage i.e. *in vitro*, field, greenhouse or cold chamber, with landraces and wild species; *in vitro* storage was considered an intermediate constraint only to the INIVIT collection of Cuba. In Africa, the picture was different; with the exception of the KARI Kenya collection, storage was considered an intermediate to important constraint for the remaining 11 collections located in this region. In Asia, the situation of germplasm storage can be qualified

on in between LAC and Africa, i.e. with the exception of the Mokpo Korea collection, 8 collections considered storage an intermediate limitation. However, it is not a constraint to the NIAS (Japan), CIP/ESEAP (Indonesia), IAS (China) and ICAR (India) collections.

The analysis shows that, contrary to storage, regeneration becomes an intermediate constraint to all LAC collections; and not so to the USDA/ARS collection. In Africa, half of the collections (6) regard regeneration as an important limitation, and the other half as an intermediate constraint. In Asia, except NIAS (JPN), and CIP/ESEAP (IDN), all other consider regeneration as intermediate to important constraint. Clearly, more collections considered plant health (both pathogen testing and eradication) as an important constraint, including 2 collections in LAC, 8 in Africa and 2 in Asia; all other collections consider plant health as an intermediate constraint (Annex 7A). Characterization is not an important limitation to the LAC and North American collections; but is important to 3 African collections (ARI, Malawi; EARI, Ethiopia; INERA, Congo) and 5 Asian (NPGRL, Philippines; VASI, Vietnam; Mokpo, PR Korea; PHCR, Thailand; and CARI, Sri Lanka) collections. All collections reported the availability of basic documentation, including passport and characterization data; however there is limited computerized data. This is not considered a constraint to the LAC and North American collections, except Cuba (intermediate). With the exception of the CIP/SSA, Uganda collection, all the Asian collections regard documentation as an intermediate limitation. In Asia, while the VASI collection of Vietnam, and the Mokpo collection of PR Korea, have basic documentation constraints, for all other collections it is either intermediate (6 collections) or it not a constraint (PhilRootcrops and NPGRL in the PHL, NIAS in JPN, CIP/ESEAP in IDN and CTRI in IND).

Safety duplication is an important constraint for the highest number of collections (22). Only four collections (CIP, NIAS, VASI and CIP/ESEAP) regarded safety duplication not a constraint; and for five other collections it was an intermediate constraint. Finally for the Melanesian collection (Papua New Guinea) plant health and safety duplication were regarded as important constraints, while germplasm storage, regeneration, characterization and documentation as intermediate (Annex 8A, 8B, and 8C).

6.2.2 Needs of individual collections

Again, using the information obtained from the questionnaire and the Manila workshop, we analyzed 31 collections to identify their needs for capacity strengthening with regard to six of the most important genebank functions: storage (*in vitro*, field, greenhouse and cold chamber) and regeneration (landraces and wild species); plant health (pathogen testing and eradication) and germplasm characterization (morphological and molecular); and documentation (data base and computerization), and safety duplication (Annex 8A, 8B and 8C).

This assessment provided the basis for the identification of priority collections for upgrading, and collections of relative higher development (Tables 5 and 6). Collections were rated as: 1=urgent; 2=intermediate or 3= no need, to reflect their capacity building needs and facilitate the analysis.

While 3 LAC and the North American collections showed no needs in capacity strengthening concerning germplasm storage (Annex 8A), the INIVIT collection from Cuba, requires strengthening *in vitro* and greenhouse/cold chamber storage. Six African (Annex 8A) and 4 Asian (Annex 8A) collections, however, have urgent needs for strengthening *in vitro* storage, but intermediate-to-no needs for field and greenhouse conservation; similar requirements were identified for the Melanesian collection. No need for capacity strengthening in regeneration of landraces is expressed by the INTA, Argentina and the CIP global collections, but wild species

regeneration in the INIVIT, Cuba; INTA Argentina; and EMBRAPA, Brazil collections is urgent (Annex 8A).

Also urgent regeneration needs of landraces exist in 7, and intermediate in 5, African collections (Annex 8A). With the exception of the NIAS, Japan, and CIP/ESEAP, Indonesian, collections, two other collections from Asia show urgent regeneration (NPGRL, Philippines and VASI, Vietnam); and 5 are intermediate (Annex 8A). With the exception of the global collection at CIP, strengthening pathogen testing and eradication are urgent for the other 3 LAC collections; and are equally urgent/intermediate in all the African collections (Annex 8B). Plant health was rated intermediate for most Asian collections except IABIOGRI, Indonesia; the Mokpo, PR Korea collection was rated urgent, but NIAS, Japan, showed no need (Annex 8 B-II). The data also show no need for strengthening morphological and molecular characterization of the LAC and the North American collections, except INIVIT, Cuba. Urgent needs to strengthening molecular characterization of 7 African, 8 Asian and 1 Melanesian collections were evident, in contrast to morphological characterization which were mostly intermediate in Africa and no need for capacity strengthening in Asia and Melanesia (Annex 8B).

Most collections have utilized the CIP/AVRDC/IBPGR descriptors, some times through modification/adaptation, for morphological characterization (CIP, AVRDC, IBPGR, 1991). One such modification was done in the Philippines (CIP-UPWARD, PhilRootcrops, NPGRL-IPB, 2006).

With exception of the LAC and North American collections, documentation of most collections from the other three regions, required urgent strengthening of computerization capacities; and needs for developing databases were intermediate in all African, Asian and Melanesian collections, except the Mokpo collection in PR Korea whose need was stronger, i.e.; urgent (Annex 8C).

Except the CIP and INTA collections in LAC, the NIAS, Japan, VASI, Vietnam, and CIP/ESEAP, Indonesia, collections all the remaining 26 collections of the five regions required safety duplications outside their current sites (Annex 8C).

6.2.3 Collections with capacity building and upgrading needs

Based on the rating of the collections conducted in the constraint analysis (Annex 7A and B), and the capacity strengthening assessment (Annex 8 A, B and C), 12 collections in total: LAC (1), Africa (6), Asia (4) and Melanesia (1), were identified for capacity building and upgrading (Table 5). Each of the 12 collections was given and order of priority (1=highest; 4=lowest) derived from the constraint rating of the 31 collections (Annex 7A and B).

First, in terms of number of accessions, close to one fourth of the total (29,016), and a similar proportion with respect to the number of landraces, are included in the 12 collections which can be good candidates for capacity building and upgrading.

Second, the most important constraints/limitations in these collections, requiring attention, in order of priority are: (i) plant health, both pathogen detection and eradication; (ii) regeneration of landraces and wild species, and germplasm characterization are equally important; (iii) germplasm storage, mainly landraces *in vitro* and botanical seed of wild species in cold chambers; and (iv) documentation, emphasizing database computerization.

Because the duplication of collections for safety purposes came up as an important need for most collections (27) it was not included in the analysis of Table 5. Since all 12 collections

have a high priority for capacity building and upgrading, the relative order (1-4) among the them becomes an additional criteria for prioritization.

Table 5. Sweetpotato collections with high priority for capacity building and upgrading (*)

Region/Country	Relative order	Number of accesions		
		Total	Landraces	Wild relatives
LAC				
INIVIT, Santo Domingo (CUB)	4	630	332	95
Africa				
KARI, Kawasi (ZMB)	4	528	418	0
Monza Res. St. (ZMB)	2	258	86	0
INERA, Mulungu (COD)	2	120	95	0
ARI, Mzuzu (MWI)	3	139	80	0
HORTI, Tengeru (TNZ)	3	584	388	0
IIAM, Umbeluzi (MOZ)	3	102	71	0
Total		**3,501**	**2,438**	**0**
Asia				
VASI, Hanoi (VNM)	1	528	418	0
NPGRL, Lo Baños (PHL)	3	183	183	0
IABIOGRI, Bogor (IDN)	4	1,520	1,400	0
MOKPO (PRK)	2	497	22	0
Total		**2,728**	**2,023**	**0**
Melanesia				
NARI , Kainantu (PNG)	4	1,750	1,120	0
TOTAL (12 collections)		**6,839**	**4,613**	**95**

(*) Prioritization was based on the identification of the following needs/constraints (in order of importance):
(i) plant health; (ii) regeneration= characterization; (iii) conservation; (iv) documentation.
Note: With the exception of the global collection at CIP, safety duplication is evenly important for all collections.

6.2.4 Sweetpotato collections of higher relative development

Besides the selection of priority collections for capacity building and upgrading (Table 5), the assessment conducted on the 36 collections allowed also the application of basic criteria for identifying collections of higher relevance (Table 6). The criteria used included not only the overall size of each collection, but also the number of landraces and the representation of wild species, the coverage of the collection in term of sources/origins of the material. Another criterion involved the likelihood that the collection contains unique components (i.e. accessions, species, genetic stocks, etc) which are not present elsewhere and/or contains traits and attributes of particular importance.

Table 6 present the 13 sweetpotato collections considered of higher development, comprising collections from LAC (3), North America (1), Africa (2), Asia (6) and Melanesia (1). Out of the 23,295 accessions which comprise the 13 collections, 16,870 correspond to landraces and wild spp. accessions. The 13 collections contain more than 80% of the total sweetpotato accessions. Based on work done at CIP (Rossel, et al. 2004) a redundancy factor of 0.5 can be assumed; thus the size of the collections considered of higher relevance would be approximately 11,600 (total), including 7,400 landraces. These collections also harbor all the wild species accounted for in the 36 collections of this assessment. The diversity of wild

species can be related to the number of species from the series Batatas which are present in each collection. Table 4 shows that the CIP, USDA/ARS and Xuzhou, China collections contain the higher diversity of wild *Ipomoea* species. Assessing the diversity of landraces in a collection, by the number of countries or geographic sites of procedence/origin, would indicate that the global collection at CIP contains the highest (49 countries of procedence), followed by the IABIOGRI collection of Indonesia (5 different procedences), the Nat. KARI collection of Uganda, the HORTI, Tengeru of Tanzania, PhilRootcrops from Philippines, and the ICAR collection in India. The number of wild *Ipomoea* accessions is also highest in the global collection (CIP) followed by USDA/ARS, IAS (China), INIVIT (Cuba), ICAR (India) and INTA (Argentina).

Table 6. Sweetpotato collections of higher relative development (*)

Collection (Country)	Number of accessions				Uniqueness rating (**)
	Total	Landraces	Wild species		
			Accession	Species	
LAC					
INIVIT, Sto. Domingo (CUB)	630	332	95	14	2.0
INTA, Castelar (ARG)	484	258	77	4	1.5
CIP, Global (PER)	7,520	4,383	1,160	67	2.5
	8,634	**4,973**	**1,332**	**85**	
North America					
USDA/ARS, Georgia (USA)	1,223	755	447	56	2.0
Africa					
NaCARI, Kampala (UGA)	1,770	1300	0	0	1.5
HORTI, Tenguru (TNZ)	584	388	0	0	1.5
	2,354	**1,688**	**0**	**56**	
Asia					
Phil Root crops, Leyte (PHL)	801	771	0	0	2.0
NPRCRTC, Benguet (PHL)	180	170	0	0	1.5
NIAS, Tsukuba (JPN)	1,600	1,600	0	0	2.0
IAS, Xuzhou (CHN)	1,855	410	120	15	1.5
IABIOGRI, Bogor (IDN)	1,520	1,400	0	0	2.0
ICAR, Kerala (IND)	3,378	2,000	84	6	2.0
	9,334	**6,351**	**204**	**21**	
Melanesia					
NARI, Kainantu (PNG)	1,750	1,120	0	0	2.0
TOTAL (13 collections)	**23,295**	**14,887**	**1,983**	**162**	

(*) Collection importance criteria: size, coverage, diversity, wild species.
(**) Uniqueness: Accessions likely not present elsewhere; occurrence of key traits and attributes
Uniqueness rating: 1 = low; 2 = moderate; 3 = possibly high

The likelihood that components of a collection may not be present in other collections can be used as a criterion for “uniqueness”. For example, in LAC nearly 1,800 landraces from Peru are unique to the global collection at CIP; likewise, landraces from the Caribbean and North America are likely to be present mainly in the INIVIT (Cuba) and USDA/ARS (USA) collections, respectively. The Philrootcrops collection includes representative samples from several Philippine islands which may no be present elsewhere; similar situations may be expected in other collections e.g. Indonesian and Indian.

6.2.5 Offers for capacity building

Information was provided by participants in the Manila workshop, on the capacities available to offer facilities and/or expertise for building capacities in key genebank functions (conservation, regeneration, plant health, documentation and safety duplication). Representatives of 8 collections presented sufficient information on facilities and/or training offers (Annex 9). Offers varied in number from 1 (by one genebank) to 5 offers (by two genebanks). The most numerous offers corresponded to facilities and training on conservation and documentation; and the minimum number of offers were on training in plant health; in deed, plant health had the least number of offers. The CIP genebank had the largest number of offers, including facilities and training, followed by ICAR, India. Conditions for collaboration through facilities and/or expertise (Training) between genebanks/collections would be a matter of future arrangement (See item # 7).

6.2.6 Collaboration: Networks and partnerships

Several sweetpotato, and sweetpotato genetic resources, networks and partnerships exist, in particular, project-specific partnerships, global and regional.

One important network is the "Asian Network for Sweetpotato Genetic Resources" (ANSWER) which was founded in 1996, in Bogor, with the participation of 12 Asian countries. ANSWER has been active through the organization and promotion of sweetpotato genetic resources workshops, training courses and conferences; e.g. an international workshop on sweetpotato genetic resources conservation and utilization by PhilRootcrops in Leyte, Philippines, 1997; a training course on maintenance, characterization and duplicate identification of sweetpotato collections at PhilRootcrops, Leyte 1997; the 2nd ANSWER international workshop in Bogor, 1999 (Rao and Hermam, 2001); the 3rd ANSWER international workshop in Bali, 2001 (supported by the Japanese genebank); a satellite meeting on sweetpotato genetic resources in Kuala Lumpur, 2005 (organized by CIP, UPWARD, and IPGRI). ANSWER's chair actively participated in the Manila workshop.

Another network is the "Users Perspectives with Agricultural Research and Development" (UPWARD). UPWARD is a CIP partnership program for regional networking in Asia; aims at supporting participatory research and development for enhancing the livelihood contribution of root and tuber crops. A majority UPWARD activity has been the linking of *in situ* and on-farm utilization with *ex situ* conservation.

UPWARD's composition includes research institutions (40%), NGOs (35%), government development and extension agencies (15%) and regional/international organizations (10%).
Other sweetpotato genetic resources-related networks are: the "Regional Potato and Sweetpotato Improvement Program in East and Central Africa" (PRAPACE), the Southern Africa Root Crops Research Network (SARNET) and the International Society for Roots and Tuber Crops (ISTRC). The vitamin A for Africa (VITAA) project is a CIP's partnership program that seeks to promote, develop and utilize orange-flesh sweetpotato germplasm.

In LAC, sweetpotato genetic resources activities are part of regional (e.g. Prociandino, Procitropicos) and international (ISTRC) networks. Specific linkages between LAC, the primary center of sweetpotato diversity, with Asian and African networks seems an obvious priority.

7. Proposed Priority Collaborative Actions

The 22 participants to the Manila workshop were splitted into five thematic working groups which were charged with the task to outline the essential parts of five action pre-proposals. Each one dealing with priority themes on sweetpotato genetic resources conservation. Since the five pre-proposals resulted highly interrelated, their merging into one comprehensive proposal, with five sequential projects, was undertaken. While the merging of the five pre-proposals attempts to achieve as much integration as possible, it does not preclude however that every project, action component could be managed and funded separately; but maintaining the context of strong integration would be highly beneficial. Perceived benefits of the global partnership program, which could come out from the merging the five pre-proposals, are many fold; e.g. cross sharing of information, data management and technological learning, inter-thematic collaboration which would benefit the overall effort, and enhanced contributions to partnership development within and between regions.

7.1 Summary of collaborative pre-proposals

7.1.1 The overall collaborative pre-proposal deals with "A Global Partnership Program in Sweetpotato Genetic Resources".

This partnership program focuses on the immediate needs for integrating collaborative action to approach the priority issues on sweetpotato conservation that have been identified and analyzed in the Manila workshop. The program also attempts to link to other, on going, global and regional activities and networks dealing with sweetpotato genetic resources and related areas (Annex 10).

7.1.2 The five action pre-proposals, which are components of the whole proposal, are:

1. Theme: Networking
Title: Development of a global network on sweetpotato genetic resources conservation and utilization.

2. Theme: Documentation
Title: 2.1 Capacity building of regional genebanks on database management for sweetpotato germplasm.
2.2 Upgrading the facilities of priority genebanks for database management of sweetpotato germplasm.
2.3 Development of a global database network for sweetpotato genetic resources.

3. Theme: Regeneration, conservation and safety duplication
Title: Regeneration, conservation and safety duplication of sweetpotato genetic resources in Asia, Africa and Latin America.

4. Theme: Plant health
Title: Upgrading capacities to enhance the health status of sweetpotato priority collections.

5. Theme: Characterization and utilization
Title: Global coordinated program for the characterization and utilization of sweetpotato genetic resources.

Organization of follow up workshops, by themes, has also been proposed; discussions on new sweetpotato issues would be part of the follow up workshops; the purpose is to guide sweetpotato genebanks' activities, germplasm characterization and utilization objectives.

The overall pre-proposal and the five specific project pre-proposals, are outlined more detail in Annex 10.

8. Process for the Implementation of the Strategy

8.1 Collaborative project implementation

In order to facilitate the design and further development of the pre-proposals, and over see their implementation the participants in the Manila workshop identified: coordinating institutions, focal persons and task forces, for each of the five project pre–proposals, by thematic areas, as follows:

1. Networking
Coordination: CIP global (Peru), and regional offices in SSA, LAC and ESEAP.
Focal persons: R. Kapinga, D. Tay and G. Rossel (CIP, Peru)
Task force: R. Kapinga (CIP-SSA); D. Tay and G. Rossel (CIP, Peru); A. Mariscal (ANSWER, Philippines); S.K. Naskar (ICAR, India).

2. Documentation
Coordination: CIP (SSA: Uganda, Mozambique; LAC, Lima and ESEAP/UPWARD, Philippines)
Focal person: M.L. Villavicencio (Nat. PGRL, Philippines)
Task force: M.L. Villavicencio (Nat. PGRL, Philippines), A. Apa (NARI, Papua New Guinea); M.D. Milian Jimenez (INIVIT, Cuba); R. Mwanga (Nat. CRRI, Uganda), R. Simon and H. Juarez (CIP, Peru).

3. Regeneration, conservation and safety duplication
Coordination: ILETRI (Indonesia), NaCRRI (Uganda), INIA (Peru); G. Rossel (CIP, Perú).
Focal person: M. Jusuf Yakub (ILETRI, Indonesia)
Task force: R. Mwanga (NaCRRI, Uganda), D. Reynoso (INIA, Peru).

4. Plant Health
Coordination: INIA (Peru), INTA (Argentina), NPRATC (Philippines)
Focal person: D. Reynoso (INIA, Peru)
Task force: D. Reynoso (INIA, Peru), N. Hompanera (INTA, Argentina), M. Andrade (IIAM, Mozambique), I. Gonzales (NPRTC, Philippines), I. Barker and A. Panta (CIP, Peru).

5. Characterization and utilization
Coordination: CIP (Peru), HORTI (Tanzania), IAS, Xuzhou (China).
Focal person: S.K. Sebastiani (HORTI, Tanzania)
Task force: S. K Sebastián (HORTI, Tanzania), G, Rossel (CIP, Peru).

It will be up to the Trust how wishes to make use of this structure for implementing sweetpotato conservation strategy and to manage the projects.
Potential funding of the proposed project could come from the Trust and/or other funding sources.

8.2 Implementation of capacity building and upgrading of individual collections

Item 6.2.3 already discussed the criteria used, and the results obtained, to identify 12 collections with priority for capacity building and upgrading (Table 5). Annex 9 presents the offers by 8 genebanks of facilities and training on major genebank functions, including

conservation (specially *in vitro*), regeneration, plant health, documentation and safety duplication. On the other hand, the project pre-proposal, listed above (Item 8.1) and described in Annex 10, includes capacity building and training on the same genebank functions. Thus, the Trust may wish to consider supporting capacity development through training of genebank personnel; the Trust may also consider supporting these genebanks to improve their facilities.

It is clear, however, that this strategy report only points out the overall and more striking needs and opportunities for capacity building and upgrading which would elicite further assessment.

Given the existence of sweetpotato networks in Asia/Pacific and Africa, the strategy can use the opportunity to enhance the networks through developing/strengthening inter-regional linkages, including the Latin American region. This approach has been outlined in more detail in Annex 10, and would promote collaboration between the larger, more developed, collections with the smaller ones.

The primary goal would be to increase the safety of conservation of the whole sweetpotato gene pool in sub-regional genebanks. The larger genebanks would maintain duplicated accessions of the entire network, and backups of unique material would be placed in the global collection at CIP.

9. References

1. Austin, D.F. 1977 Hybrid polyploids in *Ipomoea* section batatas. The Journal of Heredity 68:259-256
2. CIP. 2007. http://www.cippotato.org/sweetpotato/
3. CIP-UPWARD, PhilRootcrops, NPGRL-IPB. 2006. Revised protocols fro sweetpotato characterization in the Philippines: A Technical quide. Los Baños, Laguna, Philippines.
4. CIP, AVRDC, BPGR. 1991. Descriptors for sweetpotato. Huaman, Z., editor. International Board for Plant. Genetic Resources, Rome, Italy (ISBN 92-9043-204-7).
5. Collins,W.1998. http://www.hot.purpose.edu/newcrop/crofactsheets/sweetpotato.html
6. FAO. 1996. The State of the World's Plant Genetic Resources for Food and Agriculture. FAO, Rome.
7. FAO. 2002. The international Treaty a plant genetics resources for food and agriculture. 45 p.
8. Huaman, Z.; Zhang, D.P. 1997. Sweetpotato, in Fuccillo, D.; Sears, L., Stapleton, P. (eds.). Biodiversity in Trust: Conservation and use of plant genetic resources in CGIAR Centres. Chapter 3
9. Huaman, Z. 1992 Systematic botany and morphology of the sweetpotato plant. Technical Information Bulletin, International Potato Center, Lima (Peru). 22 p.
10. Iglesias, A.C. 2006. Produción de semilla sexual de camote *Ipomoea batatas* L. (Lam.) generado por policruzas para conservación de germoplasma. MSc Thesis, UNALAM, Lima, Perú.
11. Panta, A.C., Espinoza, C., Ynouye, C, Fuentes, S., and Roca, W. 2007. Virus incidence and elimination in sweetpotato germplasm: implications to biodiversity conservation and utilization. CIP, in preparation.

12. Rao, V.R. and Huaman, M. (eds). 2001. Conservation and utilization of sweetpotato genetic diversity in Asia. Proceding of 2nd Asian Network for Sweetpotato Genetic Resources, 3-5 Nov. 1999, Boger, Indonesia, IPRI-CIP. 73 p.

13. Rossel, G., Reynoso, D., Roca, W. 2004. Identification of duplicate accession within the sweetpotato germplasm collection using amplified fragment length polymorphisms (AFLP). Ann. Report 2004, CIP, Lima, Peru.

14. Woolfe, J.A. 1992 Sweet potato: An untapped food resource. Cambridge University Press, Cambridge (UK).643 p.

10. ACRONYMS AND ABBREVIATIONS

Countries

ARG	Argentina
BRA	Brazil
CHN	China
COD	Congo
CUB	Cuba
ETH	Ethiopia
GHA	Ghana
IDN	Indonesia
IND	India
JPN	Japan
KEN	Kenya
LKA	Shri Lanka
MDG	Madagascar
MOZ	Mozambique
MYS	Malaysia
MWI	Malawi
PHL	Philippines
PER	Peru
PNG	Papua New Guinea
PRK	D R Korea
RWA	Rwanda
TAZ	Tanzania
THA	Thailand
UGA	Uganda
USA	United States
VNM	Vietnam
ZAF	South Africa
ZMB	Zambia

Collection Holders

ARI	Agricultural Research Institute, Awasa, Ethiopia
ARI	Agricultural Research Institute, Kakamega, Kenya
ARI	Agricultural Research Institute, Namulonge, Uganda
ARI	Agricultural Research Institute, Mazozo, Angola
ARI	Agricultural Research Institute, Mzuzu, Malawi
CARI	Central Agricultural Research Institute, Shri Lanka
CIP	Centro International de la Papa
CIP/ESEAP	CIP-East South East Asia and Pacific, Bogor, Indonesia
CIP/SSA	CIP-South Saharan Africa, Kampala, Uganda
EMBRAPA	Empresa Brazilera de Pesquiza Agropecuaria, Brasilia, Brazil
FIFAMANOR	Antananarivo, Madagascar
HORTI	Horticulture Reasearch Institute, Tengeru, Tanzania
IABIOGRI	Indonesian Agriculture Biotech & Genetic Resources Institute, Bogor, Indonesia
ICAR	Central Tuber Crop Research Institute, Kerala, India
IAS-XSPRC	Xuzhou sweetpotato Research Center, Xuzhou, China.
IIAM	Instit. Investigacao Agrarian de Mozambique, Umbeluzi, Mozambique
INERA	Mulungu Research Center, Congo
ILETRI	Indonesian Legume and Tuber Crops Research Institute, Malang, Indonesia
INIVIT	Instit. Nac. de Investigaciones de Viandas Tropicales, Sto. Domingo, Cuba
INIDA	S.J. de Orgaos, Cape Verde
INTA	Instituto Nacional de Tecnología Agropecuaria, Castela, Argentina
ISAR	Rubona, Rwanda
KARI	Kenya Agricultural Research Institute, Kakamega, Kenya
CRI	Crop Research Institute, Kumasi, Ghana ATC Monza, Zambia
MARDI	Malaysian Agricultural Research and Development Institute, Selang, Malaysia

NARI	National Agricultural Research Institute, Kainantu, Papua New Guinea
NIAS	National Institute of Agrobiological Sciences, Japan
NaCRRI	National Crops Resources Research Institute, Kanyala, Uganda
NPGRL	The National Plant Genetic Resources Laboratory, UPLB, Los Baños, Philippines
NPRCRTC	Northern Philippines Root Crops Research and Training Center, Benguet, Philippines
PhilRootcrops	The Philippines Root Crop Research and Training Center, Leyte, Philippines
USDA/ARS	United States Department of Agriculture's Agricultural Research Service, Georgia, United State Ibadan, Nigeria
VASI	Plant Genetic Resources Center, Hanoi, Vietnam
VOPI	Vegetable and Ornamental Plant Institute, Pretoria, South Africa

Networks

ANSWER	Association Network fro Sweetpotato Genetic Resources, Leyte, Philippines
UPWARD	Users' Perspectives With Agricultural Research and Development
ASARECA	Association for straightens Agricultural Research, East & Central Africa Network
SADC/SARRNET	Plant Genetic Res. Network, Southern Africa
CORAF/SEWARRNET	Network, West Africa
VITAA	Vitamin A for Africa Partnership, CIP-SSA, Uganda

Annex 1A: List of sweetpotato curators who have completed the questionnaire.

	Country	Contact details of collection curators
1.	**Argentina**	Norma R. Hompanera Position/designation title: Ingeniera Agrónoma Organization: Instituto Nacional de Tecnología Agropecuaria, Instituto de Recursos Biológicos, CIRN, Castelar Address: Las Cabañas y de los Reseros s/n. Casilla de Correo 45 (1712) Castelar, Tel/fax: +54 11 4621-1057 E-mail: nhompanera@cnia.inta.gov.ar
2.	**Brazil**	JoãoBoscoCarvalho PesquisadorEmbrapaHortaliças C.Postal218CEP70.359.970, Brasília-DF www.cnph.embrapa.br
3.	**Cuba**	Marilys Diley Milián Jiménez Position/designation title: Investigadora, Jefe Recursos Fitogenéticos Organization: Instituto de Investigaciones en Viandas Tropicales (INIVIT) Address: Apdo. 6, Santo Domingo, CP 53 000, Villa Clara, Cuba. Tel: +53 42 403102; 40 3103; 40 3105; +53 42 20 8776 Fax: +53 42 40 3103 E-mail: marilysm@inivit.co.cu; marilysmilian@yahoo.es
4.	**China**	Prof. Hongmin Li Position/designation title: Vice-director of Sweetpotato Genetic and Breeding Division, Associate Professor Organization: Xuzhou Sweetpotato Research Center Address: Dong he Village, East Suburb, Xuzhou City Jiangsu Province, 221121 China Tel: +86-516-82189233, Fax: +86-516-82189209 E-mail: lihmxzsp@pub.xz.jsinfo.net OR sweetpotato@people.com.cn
5.	**India**	Dr. S.K. Naskar Position/designation title: Head Organization: Central Tuber Crops Research Institute (ICAR) Address: Regional Centre of Central Tuber Crops Research Institute Dumduma Housing Board, P.o., Bhubaneswar-751019, Orissa,India. Tel: +91-674-2470528, 2472558(O), 2558786®, Fax: +91-674-2470528 E-mail address: samiran.naskar@gmail.com
6.	**Indonesia**	Dr. Muhammad Jusuf Yakub Position/designation title: Sweetpotato curator/breeder Organization: Indonesian Legumes and Tuber Crops Research Institute Address: Jalan Raya Kendalpayak km 8 Malang, 65162, East Java. P. O. Box 66 Malang 65101 Tel: +62 341-801468, Fax: +62 341-801496 E-mail: m_jusuf@plasa.com and m_jusuf06@telkom.net
7.	**Indonesia**	Asep Setiawan, Koko Tjintokohadi CIP/ESEAP, Boger, Indonesia Email: www.eseap.cipotato.org
8.	**Japan**	Toru Kumagai Sweetpotato Breeding Research Subteam National Institute of Crop Science (NICS) National Agriculture and Food Research Organization (NARO) Email: tokuma@affrc.go.jp
9.	**Korea**	Joon-Seol Lee Mokpo Experiment Station NHAES, RDA, 534-833, Muan, Rep. of Korea E-mail: jsl@rda.go.kr

	Country	Contact details of collection curators
10.	**Madagascar**	RandrianaivoarivonyJeanMarc ProgramLeader,PotatoandSweetpotato FIFAMANOR, B.P.198, Antsirabe,Madagascar Tel:+261204424454 Email: fifamanor@netclub.mg
11.	**Papua New Guinea**	Ms. Annamarie Apa Position/designation title: Research Associate and and Curator National Highlands Sweetpotato Collection Organization: National Agriculture Research Institute (NARI) Address: NARI Main Highlands Programme Aiyura, P.O. Box 384 Kainantu Eastern Highlands Province, Papua New Guinea Tel: +675 737 3500, Fax: +675 737 3516 E-mail: narimhp@nari.org.pg
12.	**Peru**	Ms. Genoveva Rossel Position/designation title: Sweetpotato Curator Organization: International Potato Center (CIP) Address: Av. La Molina 1895, La Molina, Lima, Peru Postal address: Apartado 1558, Lima 12, Peru Tel: +511-3496017 ext. 2039 E-mail: g.rossel@cgiar.org
13.	**Philippines**	Prof. Algerico Mariscal Position/designation title: Professor/Director, Chair: ANSWER Organization: Philippine Root Crops Research and Training Center (Philrootcrops) Address: Leyte State University, VISCA, Baybay, Leyte, Philippines Tel/fax no. (0063) 53-335-2616 E-mail: ammariscal@yahoo.com
14.	**Philippines**	Prof Teresita H Borromeo Position/designation title: Professor Organization: University of the Philippines Los Baños Address: Crop Science Cluster, UPLBCA, College Laguna Philippines 4031 Tel: +63 49 536 2478, Fax: +63 49 536 2468 E-mail: thborromeo@yahoo.com
15.	**Philippines**	Ms. Ines Gonzales Position/designation title: Chief, Crop Improvement Organization: Northern Philippines Rootcrop Research and Training Center Full address: Benguet State University, La Trinidad, Benguet, Philippines Tel/fax: +63 74 4222439
16.	**Uganda**	Dr. Robert O.M. Mwanga Position/designation title: Head, Sweetpotato Research Organization: National Agricultural Research Organization (NARO) Address: National Crops Resources Research Institute (NaCRRI), Box 7084, Kampala, Uganda Tel: +25641573016; Mobile: +256772825725, Fax: +25641286947 E-mail: rmwanga@naro-ug.org and mwanga_robert@yahoo.com
17.	**Vietnam**	Nguyen Van Kien Plant genetic resources center, Vietnam Agricultural science Institute Vandien- Thanhtri –Hanoi 84-4-8614326, 84-4- 8613937 Email: ntngochue@hn.vnn.vn
18.	**USA**	Dr. Robert L. Jarret USDA/ARS/PGRU, 1109 Experiment Street, Griffin, GA 30223 USA Bob.Jarret@ARS.USDA.GOV

Annex 1B: Questionnaire on sweetpotato collections

William Roca (w.roca@cgiar.org) –CIP, Dindo Campilan (d.campilan@cgiar.org) - CIP
Genoveva Rossel (g.rossel@cgiar.org) - CIP

Background
The Global Crop Diversity Trust is supporting efforts to develop strategies for the efficient and effective conservation of crop diversity on both a regional and global crop basis. This questionnaire has been developed in order to seek the advice and input of representatives of the world's major sweetpotato collections in the development of the conservation strategy. In particular the questionnaire seeks to assess the status of sweetpotato conservation throughout the world and to identify major needs. It is intended that the Global Crop Diversity Trust (Trust) will base its support for the conservation of sweetpotato genetic resources on this strategy, once developed and adopted. We kindly request you to review questionnaire in advance, improve it and use it as a reference for your presentation or the discussion. We are keen to ensure your active participation in the development of the global sweetpotato conservation strategy.

1. General information:

Name and address of organization holding/maintaining the sweetpotato collection	
Address:	
City:	
Postal Code:	
Country:	
Web site:	
Curator in charge of the sweetpotato collection:	
Name:	
Address:	
City:	
Telephone:	
Fax:	
Email:	
Name of respondent to this questionnaire if different then above	
Contact details:	
Date of response:	

Is the organization holding the sweetpotato collection:
☐ A - an independent organization
☐ B - part of a larger organization

In the case of (B) please provide the name and address of the larger organization:
Is the organization holding the collection part of a governmental organization? ☐ yes ☐ no
If no, what type of organization is it?

Who is financing of the conservation of the sweetpotato collection?
☐ Government
☐ Government partly
☐ International or regional funding
☐ Other funding agencies: _____

Is the institution in charge of the sweetpotato collection the legal owner of the collection?
☐ yes ☐ no
If no, who is the owner (including no owner identified)?

How much time is devoted to the management of the sweetpotato collection?

……. fte (full time equivalent in per year, 1 fte means that a person is working for 100% on the sweetpotato collection)

2. Details on the sweetpotato collection

- Year of formal establishment of the sweetpotato collection:_____
- What is the main objective of the conservation of the sweetpotato collection (in terms of use and of conservation): _____

Present size of the sweetpotato collection:

Type of sweetpotato germplasm	Number of species	Total number of accessions	% available for distribution
Wild species (Series Batatas)			
Wild species (Other Series)			
Weedy (primitive) forms			
Landraces			
Modern varieties			
Others, research material, etc.			
Total			

Origin of the collection. Please state the percentage of accessions included in the collection of:

- Local origin previously collected in own country: ……%
- Introduced from abroad from the centre of diversity: ……%
- Introduced from abroad, outside the centre of diversity: ……%
- Other origin……%

3. PGR management of the sweetpotato collection

3.1 Acquisition

Was the collection increased during the last 10 years with new sweetpotato germplasm (after the international agreement on GR movement)?

☐ yes ☐ no

- If yes, how many new accessions were included of the following:
  - Wild species: _____
  - Primitive forms: _____
  - Modern varieties: _____
  - Breeding material: _____

How was the acquisition of the newly obtained germplasm conducted?

☐ Collecting in own country
☐ Collecting in other countries
☐ Introduction from other collections, institutes or private organizations
☐ Other sources please specify: _____

Are there important gaps in the sweetpotato collection?

☐ yes ☐ partly ☐ no

- If yes, what are the main gaps:

Do you plan to fill in these gaps in the next 10 years? ☐ yes ☐ partly ☐no

- If yes, how:
- If no, what are the main reasons:

- Do you plan new sweetpotato-collecting missions in the next 10 years? ☐ yes ☐ no

3.2 Regeneration

Method of regeneration: Please indicate how the sweetpotato germplasm is regenerated.

Type of germplasm	As population (sexual seed)	Vegetative by means of cuttings	In vitro

		or roots	
Wild species	Yes/no	Yes/no	Yes/no
Primitive forms	Yes/no	Yes/no	Yes/no
Modern varieties	Yes/no	Yes/no	Yes/no
Others, research material, etc.	Yes/no	Yes/no	Yes/no

Note: More than one option for the same type of material is possible

On how many plants (pl) is the generative regeneration (population) normally based?

☐ < 10 pl ☐ 10- 20 pl ☐21 – 30pl ☐> 30 pl

How many cuttings (cu) are planted for the next vegetative regeneration?

☐ < 15 cu ☐ 15 –30 cu ☐31 to 45 cu ☐> 45 cu

How many plantlets (pl) are maintained for *in vitro* regeneration?

☐ < 10 pl ☐ 11 –30 pl ☐ >30 pl

Annual capacity of regeneration/multiplication (please indicate number of accessions)

Type of germplasm	**As population (sexual seed)**	**Vegetative by means of cuttings**	In vitro
Wild species			
Primitive forms			
Modern varieties			
Others, research material, etc.			

More than one option for the same type of material is possible

Percentage of the collection that needs to be urgently regenerated, specify:

- Wild species (…%)
- Primitive forms (...%)
- Modern varieties (…%)
- Others & research material, etc. (…..%)

3.3 Identification (classification) and characterization

Are all the accessions included in your sweetpotato collection taxonomically classified?

☐ yes ☐ no - If no, please precise the percentage not identified: …%

Do you have assistance of a taxonomist for the classification of the sweetpotato germplasm?

☐ yes ☐some ☐ no

Please indicate which type of material of the sweetpotato collection is characterized.

Type of germplasm	**Descriptor list available and used**	*% of the collection* **characterised**
Wild species (Series Batatas)	Yes / no	
Wild species (Other Series)	Yes / no	
Weedy (primitive) forms	Yes / no	
Landraces	Yes / no	
Modern varieties	Yes / no	
Others	Yes / no	

Which type of descriptor list is used for characterization?

☐ Standard list of IPGRI
☐ Standard list of UPOV

☐ Independently developed list
☐ List developed by another organization, please precise: …….

3.4 Documentation and access to information of the collection

Do you use a database information system for the management of the sweetpotato collection?

☐ yes ☐ partly ☐ no If yes, what software is used for the documentation?

Which kind of data of the sweetpotato collection has been computerised? Please circle the appropriate answer.

Type of germplasm	**Passport data**	**Characterisation/ evaluation data**	**Management data***
Wild species (Series Batatas)	Yes / partly / no	Yes / partly / no	Yes / partly / no
Wild species (Other Series)	Yes / partly / no	Yes / partly / no	Yes / partly / no
Weedy (primitive) forms	Yes / partly / no	Yes / partly / no	Yes / partly / no
Landraces	Yes / partly / no	Yes / partly / no	Yes / partly / no
Modern varieties	Yes / partly / no	Yes / partly / no	Yes / partly / no
Others, research material	Yes / partly / no	Yes / partly / no	Yes / partly / no

* data related to storage, germination, distribution, etc.

In case the sweetpotato collection is not computerized, are there plans to do so in the future?

☐ No plans
☐ Computerization planned within 3 years

Is information of the sweetpotato collection accessible through the Internet? ☐ yes ☐ partly ☐ no

Are data of the sweetpotato collection included in other databases?

- Regional ☐ yes ☐ partly ☐ no
- International ☐ yes ☐ partly ☐ no

If yes or partly, specify the database:

3.5 Storage and maintenance (seed, *in vitro*, field)

Please indicate how germplasm is maintained for long- and medium-term storage.

Type of germplasm	**Storage botanical seed**	**Storage of roots**	In vitro	Cryo conservation
Wild species (Series Batatas)	Yes / no	Yes / no	Yes / no	Yes / no
Wild species (Other Series)	Yes / no	Yes / no	Yes / no	Yes / no
Weedy (primitive) forms	Yes / no	Yes / no	Yes / no	Yes / no
Landraces	Yes / no	Yes / no	Yes / no	Yes / no
Modern varieties	Yes / no	Yes / no	Yes / no	Yes / no
Other, research material, etc.	Yes / no	Yes / no	Yes / no	Yes / no

*more than one option for the same type of material is possible

What are the storage facilities and conditions of the sweetpotato genebank?

	Type of facility	**Temperature (ºC)**	**RH %**	**Packing material**
Sexual seeds				
Roots				
In vitro				
Cryo conservation				

What is the field or screenhouse maintenance outline of the sweetpotato genebank?

	Number of plants per accession*	Distance between rows	Distance between plants	Numbers of roots kept/cuttings
Wild species (Series Batatas)				
Wild species (Other Series)				
Weedy (primitive) forms				
Landraces				
Modern varieties				
Other, research material, etc.				

* In case of 1, it would be considered as 1 plant/pot within a screenhouse.

Do you apply tests to control the quality of stored germplasm? ☐ yes ☐ partly ☐ no

If yes, which tests are conducted?

☐ Germination test of sexual seed
☐ Control of the vitality and health of roots
☐ Control of true-to-type ness of *in vitro* plantlets

3.6 Health of germplasm

Is the sweetpotato collection affected by diseases that can restrict the distribution of the germplasm?

☐ yes ☐ slightly, only few accessions ☐ no

If yes or slightly, which types of diseases are causing this restriction?

☐ Seed-borne diseases in sexual seed
☐ Infection in maintained plants or roots

Is knowledge available at your institution and are there facilities for eradication of these diseases?

☐ yes ☐ limited ☐ no

Do you need assistance to improve the health status of the sweetpotato collection?

☐ yes ☐ limited ☐ no

If yes, what type of assistance will be required?

3.7 Distribution

Do you distribute material to different users? ☐ yes ☐ occasionally, special conditions ☐ no

Type of users (more than one option possible) and proportion of distribution by type of material (sexual seed, cuttings and in vitro plantlets):

☐ Domestic users:_____% ☐ Foreign users: _____%
☐ Public sector: _____% ☐ Private sector: _____%
☐ NGOs, farmers' organizations: _____%

- If yes, do you set specific conditions for distribution? Please specify:

Is the germplasm sufficiently available for distribution?

- Sexual seed: ☐ yes ☐ partly ☐ not
- Cuttings: ☐ yes ☐ partly ☐ not
- In vitro plantlets: ☐ yes ☐ partly ☐ not

How many accessions (samples) of the sweetpotato collection were distributed over the last 14 years:

- 1990-1995: _____accessions (average)

- 1995-2000: _____accessions (average)
- 2001: _____accessions (total)
- 2002: _____accessions (total)
- 2003: _____accessions (total)
- 2004: _____accessions (total)

Do you keep records of the distribution? ☐ yes ☐ No
Remark; for more questions on policies of distribution, see point 6

3.8 Safety duplication
Are the accessions of the sweetpotato collection safety-duplicated in another genebank? ☐ yes ☐ no

- If yes, please specify where the germplasm is safety-duplicated, which part (%) of the collection and under which storage conditions. Does it have a special feature?

Is there any germplasm of other sweetpotato collections safety-duplicated at your facilities?
☐ yes ☐ no

- If yes, can you specify the name of the holder of the sweetpotato collection safety-duplicated at your genebank including the number of accessions duplicated?

3.9 General management

Have you established a quality management system or written procedures and protocols for:

☐ Acquisition (including collecting, introduction and exchange)
☐ Regeneration
☐ Characterization
☐ Storage and maintenance
☐ Documentation
☐ Health of germplasm
☐ Distribution
☐ Safety duplication

In case you have procedures and protocols, are your able to provide the Trust with this information or include a copy of it? ☐ yes ☐ no

4. Utilisation of the sweetpotato collection germplasm

For what purposes is the sweetpotato collection used?
☐ Research (biosystematic, inheritance, etc.)
☐ Characterization
☐ Evaluation for important productivity & quality traits
☐ Plant breeding
☐ Biotechnology, e.g. gene isolation, molecular studies, functional genomics, etc
☐ Distribution & repatriation

Do you have a systematic evaluation program to evaluate the collection for traits?
☐ yes ☐ to be considered ☐ no

If yes, can you list the most important traits the sweetpotato collection is evaluated for?

5. Networks of sweetpotato genetic resources

Do you collaborate in (a) network(s) as sweetpotato collection holder? ☐ yes ☐ no
If, yes please list the name(s), indicate whether it is a national, regional or worldwide network.

What are the major objectives of the network(s) in which you participate?
☐ Joint conservation of sweetpotato germplasm
☐ Evaluation or characterization of sweetpotato germplasm
☐ Establishment of central sweetpotato database

☐ Rationalization of the collections
☐ Safety duplication of sweetpotato germplasm
Remark: more than one option is possible

Do you consider a worldwide network for sweetpotato genetic resources important and would you consider participating in such network? ☐ yes ☐ no
What will be your major interest for participation in a sweetpotato SPGR network?

6. Policies with regard to access of the sweetpotato collection

What is your policy regarding distribution of sweetpotato germplasm?
☐ Distribution to any *bona fide* users, without further conditions
☐ Distribution to any *bona fide* users after signing of a MTA (Material Transfer Agreement)
☐ Distribution only to users in own country
☐ Distribution only to users in certain countries after signing of a MTA
☐ Distribution only on a mutually agreed exchange basis
☐ Other flows of distribution, please specify: _____

Cost for distribution of sweetpotato germplasm:
☐ No cost, free distribution
☐ No cost, but only on the basis of reciprocal exchange of material
☐ Request to contribute for processing and shipping, specify amount: _____
☐ Request to pay for each requested accession, specify amount: _____
☐ Other conditions requested, please specify: _____

7. Future developments regarding the sweetpotato collection

Will the sweetpotato collection be extended with new material or rationalized in the next five years?
☐ The collection will keep approximately the same size
☐ The collection will be expanded to a limited extent (5-10 %)
☐ The collection will be substantially increased (> 20%)
☐ The collection will be reduced due to duplication with other collections and internal rationalization
☐ The collection will be reduced as a result of lack of funding or facilities

Are there any constraints for a suboptimal maintenance of the sweetpotato collection? ☐ yes ☐ no
If yes, what type of constraints do you face?
☐ Insufficiently trained staff
☐ Regeneration capacity to maintain the collection limited
☐ Facilities for optimal maintenance of the collection not satisfactory
☐ Others, please precise:

Will some of the above constraints result in a loss of sweetpotato germplasm?
☐ yes ☐ only incidentally ☐ no

If yes, what is the most important constraint, which may contribute to genetic erosion within the collection?

8. Further remarks

Please send the complete questionnaire to: Dr. William Roca (w.roca@cgiar.org) –CIP, Dr. Dindo Campilan (d.campilan@cgiar.org) – CIP, Genoveva Rossel (g.rossel@cgiar.org) - CIP

Annex 2A: Program for the Manila Workshop: "International Consultative Workshop on Developing a Global Strategy for ex situ Conservation of Sweetpotato Germplasm", Manila, Philippines, April 30 – May 2, 2007

Objectives

1. To consult with representatives of relevant *ex situ* sweetpotato collections in order to develop a strategy for the efficient and effective conservation of sweetpotato genetic resources;
2. To assess the state-of-the-art on global sweetpotato *ex situ* conservation and to identify collections or networks which may be eligible for long-term support by the Global Crop Diversity Trust;
3. To discuss *ex situ* conservation standards and criteria for long-term support by the Trust

Target Output

A draft strategy document for global sweetpotato *ex situ* conservation (i.e. outlining priority areas of work, standards and criteria, proposed collaboration/partnership) proposed for support by the Global Crop Diversity Trust.

Participants

Representatives of key national/international *ex situ* collections of sweetpotato, networks, CIP, Bioversity International, and workshop host institutions in the Philippines (CIP-UPWARD Partnership Program, PhilRootcrops Research and Training Center and National Plant Genetic Resources Laboratory)

PROGRAMME

TIME	TOPICS
Monday, April 30, 2007	
0830-0900	Registration
0900-1010	Plenary session (Chair: Hidelisa de Chavez) DAY 1 OBJECTIVES: Set the background for the meeting and complete the data (survey, other) • Welcome (Dindo Campilan) • Opening remarks (V. Ramanatha Rao) • Brief introduction of the participants (All) • Approval of tentative programme (William Roca) • Introduction of the Global Crop Diversity Trust and the conservation strategies (William Roca) • Discussion • Logistics Information (Hidelisa de Chavez)
1010-1030	Coffee break
1030-1230	Plenary session (Chair: Dindo Campilan) • Summary of initial key findings from survey on status of ex situ collections – William Roca • Brief presentations by representatives/curators of sweetpotato genebanks – 10-15 minutes each <u>Asia-Pacific</u> o China (Hongmin Li/Jun Tang) o India (S.K. Naskar) o Indonesia (Muhammad Jusuf) o Papua New Guinea (Annamarie Apa) o Philippines (Teresita Borromeo) o Other Asia-Pacific countries (Algerico Mariscal) <u>Africa</u> o Tanzania (Stephen Sebastiani)

TIME	TOPICS
	○ Uganda (Robert Mwanga) ○ East-Central-West Africa (Regina Kapinga) ○ Southern Africa (Maria Andrade) <u>Latin America and the Caribbean</u> ○ Argentina (Norma Hompanera) ○ Cuba (Marylis Miliam) ○ CIP-Lima (William Roca) ○ Others
1230-1400	Lunch break
1400-1500	Continue: presentations and general discussion
1500-1600	Plenary session (Chair: Mohammed Jusuf) • Networks on sweetpotato genetic resources (10-15' each) ○ Asia - ANSWER (Algerico Mariscal), UPWARD (Dindo Campilan) ○ Africa - VITAA (Regina Kapinga) ○ Others • Databases on sweetpotato genetic resources (10' each) ○ CIP database of sweetpotato collection - Genoveva Rossel ○ Philippines (Ma. Lea Villavicencio, et al) ○ Others
1600-1630	Coffee break
1630-1730	Plenary session (Chair: William Roca) General discussion on the conservation strategy, on expectations from the consultation with this advisory group and on how to proceed in the next 2 days
1830-2000	Welcome dinner
Tuesday, 1 May 2007	
0830-1000	DAY 2 OBJECTIVES: Review and analyze data, identify support needs, major gaps, information systems (William Roca) Parallel/sessions (Chair: Teresita Borromeo, Rapporteur: Ma. Lea Villavicencio) *Parallel discussions in working groups (each group to elect a facilitator and Rapporteur; the latter will make the presentation to the Plenary)* • Review and verify the data presented on the various collections • Identify significant collections and sets of accessions within collections, and identify major gaps in the diversity coverage of existing collections • Assess the current status of data and information systems
1000-1020	Coffee break
1020-1230	Continue discussion
1230-1400	Lunch break
1400-1600	• Plenary presentation of reports from working groups • General discussion and conclusions/recommendations
1600-1630	Coffee break
1630-1730	Plenary session: Chair: V. Ramanatha Rao; Rapporteur: Hidelisa de Chávez Discussion on components of draft global strategy for the conservation of sweetpotato germplasm
Wednesday, 2 May 2007	
0830-1000	DAY 3 OBJECTIVES: Towards efficient and effective global conservation of sweetpotato germplasm Chair: Algerico Mariscal; Rapporteur: Ines Gonzales Identify potential partners and collaborative arrangements, and providers of

TIME	TOPICS
	conservation services. Identify and assess the effectiveness of networks and international cooperative programmes for sweetpotato Identify and assess links to users (breeders, farmers, etc.) and major policy / technical issues (e.g. with respect to seed quality, quarantine / phytosanitary arrangements, agreed MTA, etc.) Identify the most important capacity building needs, and how might they best be addressed
1000-1030	*Coffee break*
1030-1130	Continue discussions
1130-1330	Room check-out/Lunch
1330-1530	Plenary Session Chair: Regina Kapinga; Rapporteur: Robert Mwanga • Identify the most important next steps in furthering the development and implementation of the strategy (William Roca) • Conclusion of meeting and closing of the workshop (Gelia Castillo)

Working Committees

Program and Invitation
William Roca
Dindo Campilan
Genoveva Rossel
Algerico Mariscal
V. Ramanatha Rao
Regina Kapinga

Secretariat and Logistics Support
Hidelisa de Chavez
Mayette Nadal
Martha Huanes
Algerico Mariscal

Documentation
Genoveva Rossel
Teresita Borromeo
Ma. Lea Villavicencio
Ines Gonzales

Annex 2B: List of Participants to the Manila Workshop

	Name and contact details
1.	**Ms. Annamarie Apa** Research Associate and and Curator National Highlands Sweetpotato Collection National Agriculture Research Institute (NARI) NARI Main Highlands Programme Aiyura, P.O. Box 384 Kainantu Eastern Highlands Province, Papua New Guinea Tel: +675 737 3500 Fax: +675 737 3516 E-mail: narimhp@nari.org.pg
2.	**Dr. Maria Isabel Andrade** Sweetpotato specialist, Breeder/Seed systems International Potato Center (CIP), International Institute of Tropical Agriculture (IITA) Instituto de Investigacao Agraria de Mocambique (IIAM) Avenida das FPLM 2698 Box 2100 Maputo, Mozambique Tel/ Fax: +258 21 461610 Mobile: +258 823065460 E-mail: mandrade@cgiar.org
3.	**Prof Teresita H Borromeo** Professor University of the Philippines Los Baños Crop Science Cluster, UPLBCA, College, Laguna Philippines 4031 Tel: +63 49 536 2478 Fax: +63 49 536 2468 E-mail: thborromeo@yahoo.com
4.	**Dr. Gelia Castillo** Senior Adviser Users' Perspectives With Agricultural Research and Development (UPWARD) Elvira Tan Hall, PCARRD Complex, Timugan, Los Baños, Laguna, Philippines Tel: +63 49 536-8185 Tel/fax: +63 49 536-1662 E-mail: cip-manila@cgiar.org
5.	**Dr. Dindo Campilan** Leader, UPWARD Partnership Program Users' Perspectives With Agricultural Research and Development (UPWARD) Elvira Tan Hall, PCARRD Complex, Timugan, Los Baños, Laguna, Philippines Tel: +63 49 536-8185 Tel/fax: +63 49 536-1662 E-mail: d.campilan@cgiar.org
6.	**Ms. Hidelisa de Chavez** Network Affiliate Users' Perspectives With Agricultural Research and Development (UPWARD) Elvira Tan Hall, PCARRD Complex, Timugan, Los Baños, Laguna, Philippines Tel: +63 49 536-8185 Tel/fax: +63 49 536-1662 E-mail: h.dechavez@cgiar.org or hidelisa_dechavez@yahoo.com
7.	**Ms. Ines Gonzales** Chief, Crop Improvement Northern Philippines Rootcrop Research and Training Center Benguet State University, La Trinidad, Benguet, Philippines Tel/fax: +63 74 4222439
8.	**Prof. Hongmin Li** Vice-director of Sweetpotato Genetic and Breeding Division, Associate Professor Xuzhou Sweetpotato Research Center Dong he Village, East Suburb, Xuzhou City, Jiangsu Province, 221121 China Tel: +86-516-82189233 Fax: +86-516-82189209 E-mail: lihmxzsp@pub.xz.jsinfo.net OR sweetpotato@people.com.cn
9.	**Dr. Norma R. Hompanera** Ingeniera Agrónoma Instituto Nacional de Tecnología Agropecuaria, Instituto de Recursos Biológicos, CIRN, Castelar Las Cabañas y de los Reseros s/n. Casilla de Correo 45 (1712) Castelar Tel/fax: +54 11 4621-1057 E-mail: nhompanera@cnia.inta.gov.ar
10.	**Dr. Marilys Diley Milián Jiménez** Investigadora, Jefe Recursos Fitogenéticos Instituto de Investigaciones en Viandas Tropicales (INIVIT) Apdo. 6, Santo Domingo, CP 53 000, Villa Clara, Cuba. Tel: +53 42 403102; 40 3103; 40 3105; +53 42 20 8776 Fax: +53 42 40 3103 E-mail: marilysm@inivit.co.cu; marilysmilian@yahoo.es

	Name and contact details
11.	**Prof. Jun Tang** Director of Sweetpotato Germplasm Division, Associate Professor Xuzhou Sweetpotato Research Center Dong he Village, East Suburb, Xuzhou City, Jiangsu Province, 221121 China Tel: +86-516-82189232 Fax: +86-516-82189209 E-mail: tangjun5886@163.com
12.	**Dr. Regina Emilian Kapinga** Sweetpotato Breeder-SSA Region International Potato Center Address: Plot 7, Bandali Rise, Bugolobi P.O. Box 22274 Kampala, Uganda Tel: +256 41 287571, Fax: +256 41 287538 E-mail: r.kapinga@cgiar.org
13.	**Prof. Algerico Mariscal** Professor/Director, Chair: ANSWER Philippine Root Crops Research and Training Center (Philrootcrops) Leyte State University, VISCA, Baybay, Leyte, Philippines Tel/fax no. (0063) 53-335-2616 E-mail: ammariscal@yahoo.com
14.	**Dr. Robert O.M. Mwanga** Head, Sweetpotato Research National Agricultural Research Organization (NARO) National Crops Resources Research Institute (NaCRRI), Box 7084, Kampala, Uganda Tel: +25641573016; Mobile: +256772825725 Fax: +25641286947 E-mail: rmwanga@naro-ug.org and mwanga_robert@yahoo.com
15.	**Dr. S.K. Naskar** Head, Central Tuber Crops Research Institute (ICAR) Regional Centre of Central Tuber Crops Research Institute Dumduma Housing Board P.o., Bhubaneswar-751019, Orissa,India. Tel: +91-674-2470528, 2472558(O), 2558786(R) Fax: +91-674-2470528 E-mail address: samiran.naskar@gmail.com
16.	**Dr. Ramanatha Rao** Senior Scientist Bioversity International P.O.Box 236, UPM Post Office, 43400 Serdang, Selangor Darul Ehsan, Malaysia Tel: +60-3-89423891 Fax: +60-3-89487655 E-mail: v.rao@cgiar.org

	Name and contact details
17.	**Dr. Willy Roca** Consultant, Genetic Resources International Potato Center (CIP) Address: Apartado 1558, Lima 12, Peru Tel: +51-1-3175337 Fax: +51-1-3175326 E-mail: w.roca@cgiar.org
18.	**Ms. Genoveva Rossel** Sweetpotato Curator International Potato Center (CIP) Av. La Molina 1895, La Molina, Lima, Peru Postal add: Apartado 1558, Lima 12, Peru Tel: +511-3496017 ext. 2039 E-mail: g.rossel@cgiar.org
19.	**Dr. Stephen Kuoko Sebastiani** Principal Agriculture Research Officer Horticulture Research Institute Horti-Tengeru P.O.BOX 1253 Arusha, Tanzania Tel: +255 754 382046 Email: skuoko@yahoo.com
20.	**Dr. Daniel Reynoso** Head, National Institute of Agricultural Research (INIA) Av. La Molina No 1981, La Molina, Lima, Peru Tel/fax: +51 1 349-5616/5649 Email: jefatura@inia.gov.pe/ dreynoso@inia.gov.pe
21.	**Dr. Muhammod Jusuf Yakub** Sweetpotato Curator/Breeder Indonesian Legumes and Tuber Crops Research Institute (ILTRI) Jalan Raya Kendalpayak Km 8 Melong, 65162 East Java, P.O. Box 66 Melong, 65162, Indonesia Tel: +62 341-801468 +62 341-801496 Email: mjusuf@plasa.com Mjusuf06@telkom.net

Annex 3. Data obtained/ summarized from the questionnaires

Table 1. General information on the sweetpotato collections

Collection/ Country	Type of Organization	Funding Source	Year of Establishment	Legal owner of collection	Full Time Equivalent (FTE)
Latin America					
CIP, PER	International	International funds	1985	IT, Gov. Body	6.70
INTA, ARG	Governmental	Government	1991	Government	0.50
EMBRAPA, BRA	Governmental	Government	1985	Government	0.50
INIVIT, CUB	Governmental	Government	1967	Government	No inf.
North America					
USDA/ARS, USA	Governmental	Government	1985	Government	1.25
Asia					
CIP/ESEAP, IDN	International	International funds	1993	International	0.60
IABIOGRI, IDN	Governmental	Government	1992	Government	2.00
Philrootcrops, PHL	Independent Org.	Government	1997	Government	No inf.
Xuzhou, CHN	Independent Org.	Government / Reg.	1997	Government	3.00
Mokpo, PKR	Governmental	Government	1993	Government	5.00
VASI, VNM	Governmental	Government	1993	Government	1.00
NPGRL, PHL	Governmental	Government	1985	University	0.15
NIAS, JPN	Governmental	Others funding	1985	Res. Institute	No inf.
ICAR, IND	Governmental	Governmental	-	Government	No inf.
NPRCRTC, PHL	Governmental	Government	1987	Government	No inf.
Africa					
FIFAMANOR, MDG	Governmental	Government, partly	1993	Government	0.10
NACRRI, UGA	Governmental	Government, partly	2005	Government	1.00
Melanesia					
NARI, PNG	Independent	Government, partly	1980	Independent	0.50
Total	Governmental =13 Independent =3 International =2	Government =15 Independent =2 Other =1	Earliest =1980 Latest =2005	Government =14 Internationals =1 Other =3	Range 0.1 – 6.7 FTE $\bar{X}$ = 1.72 FTE

Annex 3.

Table 2A. Composition, IT status and size of the 18 larger sweetpotato collections

Collection/Country	International Treaty-ratification	Landraces	Wild species		Improved material	TOTAL	
			Spp.	Acc.	Acc. (*)	Spp.	Acc.
LATIN AMERICA AND CARIBBEAN							
1. CIP, Lima, PER	Yes	4,383	67	1,160	1,977	68	7,520
2. INTA, Castelar, ARG	No	258	4	122	104	5	484
3. EMBRAPA, Brasilia, BRA	Yes	982			42	1	1,024
4. INIVIT, Sto. Domingo, CUB	Yes	332	14	95	203	15	630
NORTH AMERICA							
5. USDA/ARS, Georgia, USA	No	755	56	447		57	1,202
ASIA							
6. CIP/ESEAP, Bogor, IDN	Yes	1,070			296	1	1,366
7. IABIOGRI, Bogor, IDN	Yes	1,400			120	1	1,520
8. PhilRootcrops, Leyte, PHL	Yes	771			30	1	801
9. IAS, Xuzhou, CHN	No	410	15	40	634	16	1,084
10. MOKPO, PR Korea, PRK	Yes	22			475	1	497
11. VASI, Hanoi, VNM	No	418			62	1	480
12. NPGRL, Los Baños, PHL	Yes	183				1	183
13. NIAS, Tsukuba, JPN	-	1,600				1	1,600
14. ICAR, Kerala, IND	Yes	2,000	6	84	1,778	7	3,862
15. NPRCR TC, Benguet, PHL	Yes	170			10	1	180
AFRICA							
16. FIFAMANOR, Antanarivo, MAG	Yes	3			95	1	98
17. NACRRI, Kampala, UGA	Yes	1,300			508	1	1,808
MELANESIA							
18. NARI, Kainantu, PNG	No	1,120	-	-	-	-	1,120
Total 18 collections		**17,177**	**162**	**1,948**	**6,334**	**163**	**25,459**

(*) Includes: improved varieties and breeding lines under development.

Annex 3.

Table 2B. Composition, IT status and size of the 18 smaller sweetpotato collection

Collection/Country	International Treaty-ratification	Landraces	Wild species		Improved material	TOTAL	
			Spp.	Acc.	Acc.	Spp.	Acc.
AFRICA							
1. CIP/ESEAP, Kabete, UGA	Yes	60	-	-	81	1	141
2. INERA, Mulungu, COD	Yes	96	-	-	24	1	120
3. KARI, Kuwasi, GHA	Yes	120	-	-	47	1	167
4. Univ. Ibodan, NGR	No	5	-	-	85	1	90
5. Monza Res. St, ZMB	Yes	86	-	-	172	1	258
6. ARI, Mzuzu, MWI	Yes	80	-	-	59	1	139
7. IIAM, Umbeluzi, MOZ	-	71	-	-	31	1	102
8. VOPI, Pretoria, ZAF	-	21	-	-	423	1	444
9. ARI, Mazozo, AGO	Yes	3	-	-	31	1	34
10. EARI, Awasi, ETH	Yes	31	-	-	288	1	319
11. KARI, Kakamanga, KEN	Yes	90	-	-	30	1	120
12. HORTI, Tenguru, TNZ	Yes	388	-	-	196	1	584
13. ISAR, Rubana, RWA	-	23	-	-	126	1	159
14. INIDA, S. J. Orgaos, CPV	No	11	-	-	-	1	11
ASIA							
15. MARDI, Selang, MYS	Yes	31	-	-	41	1	72
16. PHRC, THA	No	105	-	-	131	1	236
17. CARI, LKA	-	60	-	-	71	1	131
18. S. Korea, KOR	-	12	-	-	418	1	430
Total 18 collections		**1,293**	**0**	**0**	**2,254**	**1**	**3,557**

Annex 3

Table 3. Sweetpotato germplasm acquisitions and future plans

Collection/ Country	Acquisition over last 10 years			Gaps in collection	Collecting missions planned	Expansion collection next 5 yrs.
	Landrace Acc	Wild Acc.	Other Acc.			
Latin America		-				
CIP, PER	331	-		Yes: Latin America, Melanesia, Africa *I. batatas,I. spp.*	Yes	5 - 10%
INTA, ARG	0	-	50	Partial	Partial	5 - 10%
EMBRAPA, BRA	0	-	0	No	No	-
INIVIT, CUB	22	-	22	Yes, wild species (traits)	Yes	+20%
North America		-				
USDA/ARS, USA	Yes, No inf.	-		Yes: geographic *I. batatas, I. spp.*	Yes *I. spp.*	5 - 10%
Asia		-				
CIP/ESEAP, IDN	0	-		Yes	No	- exchange
IABIOGRI, IDN		-	96	Yes	No	5 %
Philrootcrops, PHL	Yes, No inf.	-		Yes: geographic	Yes	5 - 10%
Xuzhou, CHN	Yes, --	30	115	Partly	Yes	5 %
Mokpo, PKR	Yes, No inf.	-		Partly	Yes	---
VASI, VNM	18	-	6	Yes: geographic	Yes	5 - 10%
NPGRL, PHL	No inf.	-		Yes,	Yes	5 - 10%
NIAS, JPN	Yes, No inf	-		No	Yes	No
ICAR, IND	Yes, No inf	-		No inf.	No inf.	No inf.
NPRCRTC, PHL			20	Yes	Yes	5 - 10%
Africa						
FIFAMANOR, MDG	Yes		116	Yes, traits	Yes	?
NACRRI, UGA	Yes		215	Yes, wild relatives and landraces	Yes	No
Melanesia						
NARI, PNG	No	0	0		Yes	Will be reduced
Total	11 organization	1 organization	8 organization	Yes = 11	Yes =13	Range = 5 - 20%

Annex 3

Table 4. Identification and characterization of collections

Collection/ Country	Classification of Accessions	Assistance of Taxonomist	Descriptor List	% Collection characterized
Latin America				
CIP, PER	Yes, most	Yes	IPGRI's	+80% landraces
INTA, ARG	yes	Yes	IPGRI's	100% weedy, landraces modern vars.
EMBRAPA, BRA	Yes	No inf.	IPGRI's	70% landraces, and 100% modern vars.
INIVIT, CUB	Yes Most	Yes	IPGRI's + independent	50% wild; 100% landraces, and modern vars.
North America				
USDA/ARS, USA	Yes, most	Some	Modified IPGRI's	80-90%, landraces, wild
Asia				
CIP/ESEAP, IDN	Yes	No	IPGRI's	100% landraces, 20% modern vars.
IABIOGRI, IDN	Yes	No	IPGRI's	100% landraces, 20% modern vars.
Philrootcrops, PHL	Yes, most	No	IPGRI's	100% landraces, 100% modern vars.
Xuzhou, CHN	Yes	Some	Independent list	100% all
Mokpo, PKR	Yes	No	Different list	50-100%
VASI, VNM	No	No	IPGRI's	50%.
NPGRL, PHL	Yes, all	- ?	IPGRI's	28%
NIAS, JPN	Yes, all	No	Independent list	90-100%
ICAR, IND	No inf	No inf	No, inf	24%
NPRCRTC, PHL	Yes	No	IPGRI's	80% landraces, modern vars.
Africa				
FIFAMANOR, MDG	Not	No	Independent	20% landraces
NACRRI, UGA	Yes	No	IPGRI's	100% landraces, and modern vars.
Melanesia				
NARI, PNG	Yes	No	Independent list	84% landraces
Total	Yes=15	Yes=3	IPGRI's =12	Landraces=20-100% Wild=0-50% Moderna Variedad=20-500

Annex 3

Table 5. Regeneration of sweetpotato collections: Landraces

Collection/ Country	Mode of regeneration and conservation	No. cuttings, plants or plantlets used for regeneration	Genebank annual capacity for regeneration	% urgent regeneration Needs
Latin America				
CIP, PER	In vitro, stem cuttings	2 cuttings, 3-4 plantlets	4,500 acc. (in vitro)	25%
INTA, ARG	In vitro, cuttings, seed	< 10 plants, <15 cuttings, <10 plantlets	300 Cuttings (greenhouse), 364 acc. in vitro	0%
EMBRAPA, BRA	In vitro, cuttings	< 10 plants, <15 cuttings, <10 plantlets	No inf.	No inf.
INIVIT, CUB	In vitro, cuttings	10-20 plants, 15-30 cuttings, <10 plantlets	535 acc. Vegetative, 24 acc. Wild, 80 acc. In vitro	No inf.
North America				
USDA/ARS, USA	In vitro	11-30 plantlets	No inf.	0%
Asia				
CIP/ESEAP, IDN	In vitro, stem cuttings	15-30 cuttings, 3-4 plantlets	296 acc.	No inf.
IABIOGRI, IDN	In vitro, stem cuttings	< 15 cuttings < 10 plantlets	75 acc.	50-75%
Philrootcrops, PHL	In vitro, stem cuttings	< 10 plantlets	No inf.	No inf.
Xuzhou, CHN	In vitro, stem cuttings	15-30 cuttings 11-30 plantlets	412 acc.	No inf.
Mokpo, PKR	Stem cuttings	15-30 cuttings	216 acc.	No inf.
VASI, VNM	In vitro, stem cuttings	< 15 cuttings	50 acc.	100%
NPGRL, PHL	In vitro, cuttings	<10 plants, <15 cuttings	50 acc.	100%
NIAS, JPN	Cuttings	<15 cuttings	1600 modern varieties	0%
ICAR, IND	Cuttings, field, in vitro, seed	---	All in the field	No inf.
NPRCRTC, PHL	In vitro	No inf.	20 acc.	67%
Africa				
FIFAMANOR, MDG	In vitro, stem cuttings	< 15 cuttings < 10 plantlets	98 acc.	25-75%
NACRRI, UGA	In vitro, cuttings	>30 plants, >45 cuttings, 11-30 plantlets	34 seed, 200 cuttings in greenhouse, 8 in vitro	50 –90%
Melanesia				
NARI, PNG	Cuttings, field	<10 plants, <15 cuttings	1,120 cuttings in greenhouse	50%
Total	In vitro=15 Stan cultivate=15	-	Range 20 – 4,500 acc.	10 collection = 0 - 100% 8 collections = no inf.

Annex 3

Table 6. Regeneration of sweetpotato collections: Wild species

Collection/ Country	No. plants regenerated	Annual capacity (acc.)	% needing urgent regeneration	No. acc. needing urgent regeneration
Latin America				
CIP, PER	< 10	100	50%	650
INTA, ARG	< 10	100	0%	0
EMBRAPA, BRA	< 10	ok	No inf.	No inf.
INIVIT, CUB	10 - 20	24 acc.	20%	20
North America				
USDA/ARS, USA	10-20	15-30	20%	4
Asia				
CIP/ESEAP, IDN	---	---	---	---
IABIOGRI, IDN	---	---	---	---
Philrootcrops, PHL	---	---	---	---
Xuzhou, CHN	10-20	40	ok	ok
Mokpo, PKR	---	---	---	---
VASI, VNM	---	---	---	---
NPGRL, PHL	---	---	---	---
NIAS, JPN	---	---	---	---
ICAR, IND	---	---	---	---
NPRCRTC, PHL	---	---	---	---
Africa				
FIFAMANOR, MDG	---	---	---	---
NACRRI, UGA	---	---	---	---
Melanesia				
NARI, PNG	No	---	---	---
Total	6 Collections = < 10- 20	15 - 100	Range = 0 - 50%	Range =0 - 650

Annex 3

Table 7. Evaluation of sweetpotato collections

Collection/ Country	Evaluation (ad-hoc or systematic)	Type of evaluation				
		Biotic	Abiotic	Quality	Nutrition	Yield
Latin America						
CIP, PER	Systematic / Ad-hoc	x	x	x	x	x
INTA, ARG	Ad-hoc	x	---	x	---	---
EMBRAPA, BRA	Ad-hoc	x	---	x	---	---
INIVIT, CUB	Systematic	x	x	x	---	x
North America						
USDA/ARS. USA	Ad-hoc	x		x		x
Asia						
CIP/ ESEAP, IDN	Systematic	x	x	x		
IABIOGRI, IDN	Systematic	x		x	x	x
PhilRootcrops, Philippines	Systematic	x		x	x	x
Xuzhou, CHN	Systematic	x	x	x		
Mokpo, PKR	Systematic				x	x
VASI, VNM	Systematic	x		x	x	x
NPGRL, PHL	Ad-hoc					
NARO, JPN	Systematic	X				
ICAR, IND	Systematic	X				
NPRCRTC, PHL	Systematic	x		x	x	x
Africa						
FIFAMANOR, MDG	Systematic	x		x		x
NaCRRI, Uganda	Systematic	x	x	x	x	
Melanesia						
NARI, PNG	Ad-hoc		X			X
Total	Systematic=13 Ad-hoc =5	15	6	13	7	10

Annex 3

Table 8. Documentation and access to information on the collections

Collection/ Country	Database	Collection Computerized	Data computerized			Internet access
			Passport	Charact / Eval.	Management	
Latin America						
CIP, PER	Yes	Yes	Yes	Yes	Yes	Yes
INTA, ARG	Partly	Yes	Yes	Yes	Partly	Partly
EMBRAPA, BRA	Yes	Yes	Yes	Yes	Yes	Partly
INIVIT, CUB	Yes	Yes	Yes	Yes, partly	Yes	No
North America						
USDA/ARS. USA	Yes	Yes	Yes	Yes	Partly	Partly
Asia						
CIP/ ESEAP, IDN	Yes	No	Partly	Partly	Partly	No
IABIOGRI, IDN	Yes	No	Partly	Partly	Partly	No
PhilRootcrops, PHL	Yes	No	Partly	Partly	No	No
Xuzhou, CHN	Yes	No	No	Partly	Partly	No
Mokpo, PKR	No	No	No	No	No	No
VASI, VNM	Partly	No	Yes	Yes	Partly	No
NPGRL, PHL	Yes	Yes	Yes	Partly	No	No
NARO, JPN	Yes		Yes	Partly	No	Yes
ICAR, IND	Yes	Yes	Yes	Partly	?	?
NPRCRTC, PHL	Partly	No	Partly	Partly	Partly	No
Africa						
FIFAMANOR, MDG	No	No	No	Partly	No	No
NaCRRI, UGA	Partly	Yes	Yes	Partly, yes	Partly, yes	No
Melanesia						
NARI, PNG	Yes	Partly	Yes	Partly	No	No
Total	Yes =12 Partly – no= 6	Yes = 8 No = 8	Yes=11 Partly – no =7	Yes=7 Partly – No=11	Yes=3 Partly – no=13	Yes=2 Partly =3 No=12

Annex 3

Table 9. Storage methods and conditions

Collection/ Country	Botanical seed storage		In vitro storage	Greenhouse or Field maintenance
	Period	Conditions		
Latin America				
CIP, PER	Medium-term	0oC, 60%RH	Yes, all clonal material	Yes
INTA, ARG	Long-term	-20 oC	Yes, all clonal material	Yes
EMBRAPA, BRA	Short-term	5 oC	Yes, all clonal material	No
INIVIT, CUB	Short-term	4 oC	Yes, all clonal material	---
North America				
USDA/ARS, USA	Long-term	-20oC	Yes, all clonal material	Yes, Limited
Asia				
CIP/ ESEAP, IDN	Short-term	4oC	Yes, all clonal material	Yes, Limited
IABIOGRI, IDN	No	No	---	Yes
PhilRootcrops, PHL	No	No	Yes, 25oC	Yes
Xuzhou, CHN	No	No	Yes, 20oC	Yes
Mokpo, PKR	No	No	---	---
VASI, VNM	No	No	---	Yes
NPGRL, PHL	No	No	---	Yes
NARO, JPN	No	No	No	Yes
ICAR, IND	Yes	No inf.	Yes, Partly	Yes Field, most of collection
NPRCRTC, PHL			---	Yes
Africa				
FIFAMANOR, MDG	No	No	---	---
NaCRRI, UGA	Short term	18-25 oC	Yes, 24 oC	Yes, Field and Greenhouse
Melanesia				
NARI, PNG	No	No	No	Yes, Field, all landraces
Total	Short- medium = 5 Long-term =2 No =9		Yes=10	Yes=12

Annex 3

Table 10. Health status of sweetpotato collections

Collection/ Country	Germplasm Affected by pathogens	Type of disease	Eradication Capacity	Assistance required to improve Health Status
Latin America				
CIP, PER	Yes	Virus	Yes	Yes, Financial
INTA, ARG	Slightly	Virus	Limited	Yes, Financial
EMBRAPA, BRA	Yes	Virus	Limited	Yes, Technical
INIVIT, CUB	No	---	---	---
North America				
USDA/ARS, USA	Slightly	Infection, plants	Limited	No
Asia				
CIP/ ESEAP, IDN	No	---	Yes	Yes, training
IABIOGRI, IDN	Slightly	Infection, plants (virus)	Yes	Yes, training-virus
PhilRootcrops, PHL	Slightly	Infection, plants	Yes	Yes, training-pests/ diseases
Xuzhou, CHN	Slightly	Infection, plants	Limited	Yes, financial, technical
Mokpo, PKR	Yes	Infection, plants	Limited	Limited,
VASI, VNM	Slightly	Infection, plants	Limited	Yes, disease management, control, facilities
NPGRL, PHL	Yes	Virus	Yes	Yes, clean from virus
NARO, JPN	Yes	Virus	Yes	Limited
ICAR, IND	No inf.	No inf.	No inf.	No inf.
NPRCRTC, PHL	Yes	Infection, plants	Limited	Yes, training-virus indexing, thermotherapy
Africa				
FIFAMANOR, MDG	Slightly	Infection, plants	Limited	Yes, training, financial
NaCRRI, UGA	Yes	Infection, plants	Yes	Yes, training, financial
Melanesia				
NARI, PNG	Yes	Infection, plants	No	Yes, pest, diseases fungal and viral, eradication and clean planting material
Total	Yes- Slightly =015 No=2	Virus=15	Yes=7	Yes=13

Annex 3

Table 11. Distribution of sweetpotato germplasm to users

Collection/ Country	Average annual distribution (acc.) (1996-2006)	% of total distribution				
		Domestic	Foreign	Public sector	Private Sector	NGO's farmers, etc.
Latin America						
CIP, PER	315	30	66	96	2	1
INTA, ARG	95	100	0	90	10	---
EMBRAPA, BRA	Occasional	100	0	95	0	5
INIVIT, CUB	Occasional	95	5	90	0	10
North America						
USDA/ARS, USA	466	84	16	80	18	2
Asia						
CIP/ESEAP, IDN	153	?	?	?	Yes	Yes
IABIOGRI, IDN	80	10	0	10	10	0
PhilRootcrops, PHL	10	?	?	?	?	?
Xuzhou, China	50	98	2	32	?	?
Mokpo, PKR	?	100	0	30	70	?
VASI, VNM	69	5	95	80	15	5
NPGRL, PHL	No	5	---	100	0	---
NARO, JPN	Yes	100	0	---	---	---
ICAR, IND	No inf.	---	---	---	---	---
NPRCRTC, PHL	20	50	--	20	30	10
Africa						
FIFAMANOR, MDG	2	100	0	0	0	100
NaCRRI, UGA	18	5	1	5	19	70
Melanesia						
NARI, PNG	96	Yes +++	Yes +-	Yes+++	Yes +	Yes ++
Total	Range=10 - 466	Range=5 - 100	Range=2 - 95	Range = 5-100	Range=2 - 70	Range=1 - 100

Annex 3

Table 12. Safety duplication of sweetpotato collections

Collection/ Country	Organized	Place of duplication	Holding safety duplicates of other SP collections
Latin America			
CIP, PER	Yes	CIAT, Colombia 82% in vitro	No
INTA, ARG	No	__	No
EMBRAPA, BRA	No	__	No
INIVIT, CUB	Yes	CIP (15%)	No
North America			
USDA/ARS, USA	Yes	Fort Collins No inf.	No
Asia			
CIP/ESEAP, IDN	Yes	CIP, Perú 10% Papua collection in vitro	No
IABIOGRI, IDN	Yes	-	No
PhilRootcrops, PHL	No	No	No
Xuzhou, CHN	Yes	70% in vitro, 100% field, 100% pot	No
Mokpo, PKR	No	No	No
VASI, VNM	Yes	Three locations	Yes?
NPGRL, PHL	No	No	
NARO, JPN	No specify	__	__
ICAR, IND	No inf.	No	No
NPRCRTC, PHL	No	No	No
Africa			
FIFAMANOR, MDG	No	No	No
NaCRII, UGA	No	No	No
Melanesia			
NARI, PNG	No	No	No
Total	Yes= 7 No=11		All = no

* see new African information

Annex 3

Table 13. Accessibility of germplasm for distribution and availability of information

Collection/ Country	Accessibility conditions	Mode of distribution	Annual average distribution	Data available on Internet
Latin America				
CIP, PER	Freely, SMTA	In vitro, DNA, seed	315	Yes
INTA, ARG	Freely, MTA	In vitro, seed	No inf.	partly
EMBRAPA, BRA	Freely, MTA	In vitro, seed	No inf.	partly
INIVIT, CUB	Freely, MTA	In vitro	No inf.	No
North America				
USDA/ARS, USA	Freely	In vitro, DNA, seed, cuttings	466	Yes
Asia				
CIP/ESEAP, IDN	Freely, MTA	In vitro, cuttings	153	Yes
IABIOGRI, IDN	No information	In vitro (partly)	80	No information
PhilRootcrops, PHL	No information	Cuttings	10	No information
Xuzhou, CHN	Certificate of use	Cuttings, in vitro	50	No information
Mopko, PKR	No information	Cuttings	-	No information
VASI, VNM	Request; report on use	Cuttings	69	No information
NPGRL, PHL	Freely, MTA	Cuttings, in vitro	No inf.	No inf.
NARO, JPN	No inf.	Cuttings	No inf.	No
ICAR, IND	-	-	-	-
NPRCRTC, PHL	Freely, MTA	In vitro (partly) Cuttings,	20	No
Africa				
FIFAMANOR, MDG	No information	-	2	No information
NaCRII, UGA	Limited own country + certain countries	Cuttings, seed	4	No inf.
Melanesia				
NARI, PNG	Limited; MTA	Cuttings	10 acc.	No
Total	Freely =8 Limited=2	In vitro=10 Cuttings =7 Seed=5	Range=2 – 315 (11 Greenhouse)	Yes=3 Partly=2 No=12

Annex 3

Table 14. General management of the sweetpotato collections (Existence of functional protocols and procedures in genebanks)

Collection/ Country	Acquisition	Regenera-tion	Characte-rization	Storage	Documen-tation	Health	Distribution	Safety duplication
Latin America								
CIP, PER	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INTA, ARG	-	Yes	Yes	Yes	Yes	-	-	-
EMBRAPA, BRA	-	-	Yes	Yes	Yes	-	-	-
INIVIT, CUB	Yes	Yes	Yes	Yes	Yes	Yes		
North America								
USDA/ARS, USA	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Asia								
CIP/ESEAP, IDN	-	-	-	-	-	-	-	-
IABIOGRI, IDN	Yes	Yes	Yes	Yes	Yes	-	Yes	-
PhilRootcrops, PHL	-	-	Yes	Yes	Yes	-	-	-
Xuzhou, CHN	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes
Mokpo, PKR	Yes	Yes	Yes	Yes	-	Yes	-	-
VASI, VNM	-	Yes	Yes	Yes	-	-	-	-
NPGRL, PHL	Yes	Yes	Yes					
NARO, JPN	-	-	-	-	-	-	-	-
ICAR, IND	-	-	-	-	-	-	-	-
NPRCRTC, PHL	-	-	-	-	-	-	-	-
Africa								
FIFAMANOR, MDG	Yes	-	-	-	-	-	-	-
NaCRII, UGA	-	Yes	Yes	Yes	Yes	-	Yes	-
Melanesia								
NARI, PNG	No	-	-	-	-	-	-	-
Total	Yes = 7 No= 1 No inf.=9	Yes=10 No inf.=8	Yes=12 No inf.=6	Yes=11 No inf.=7	Yes=8 No inf.=10	Yes=5 No inf.=13	Yes=5 No inf.=13	Yes=3 No inf=15

Annex 3

Table 15. Complementary information on sweetpotato collections from Africa

Collection	Country	Total Number Accessions	Number Landraces	Number Wild spp	Number Breeding lines
Crop Res. Inst; Kumasi	Ghana	167	120	0	47
CIP/SSA	Uganda	141	34	0	107
Univ. Ibadan	Nigeria	90	5	0	85
INIDA, S.J. dos Orgaos	Cape verde	11	11	0	0
Agr. Tech. center Mansa	Zambia	258	86	0	172
ARI, Mzuzu	Malawi	139	80	0	59
INERA, Mulungu	D.R. Congo	120	95	0	25
ARI, Umbeluzi	Mozambique	102	71	0	31
VOPI, Pretoria	S. Africa	444	21	0	423
ARI, Mazozo	Angola	34	3	0	31
ARI, Awasa	Ethiopia	319	31	0	288
ARI, Kakamega	Kenya	120	90	0	30
HORTI, Tengeru, Arusha	Tanzania	584	388	0	196
ARI, Rubona	Rwanda	159	23	0	136
Total	14	2,688	1,058	0	1,630

Annex 3

Table 16. Complementary information on sweetpotato collections from Asia

Country	Total Number accession	Number Landraces	Number Wild spp access	Number Breeding lines (acc.)
NHAES, South Korea	430	12	0	418
MARDI, Malaysia	72	31	0	41
CARI, Shiri Lanka	131	60	0	71
PHRC, Thailand	236	105	0	131
Total (4)	869	208	0	661

Annex 4. Nature of holders, current source of support and access conditions of sweetpotato collections by region

	Number of collections by region					
	LAC	**North America**	**Africa**	**Asia**	**Melanesia**	**Total**
Holder						
Government	3	1	18	11	0	33
Research inst./university	0	0	0	2	0	2
International organization	1	0	0	1	0	2
Funding source						
Public national	3	1	17	12	1	34
Public international	1	0	0	0	0	1
Other	0	0	0	1	0	1
Accessibility						
Free, with MTA (*)	3	0	11	8	0	22
Free, no MTA	0	1	3	0	0	4
Agreement needed	0	0	0	1	0	1
Limited access	0	0	1	0	1	2
N. D.	0	0	1	5	0	6

(*) Collections located in countries that have ratified the IT (Annex 3: Tables 2A and 2B)

Annex 5A: Regeneration details of 12 sweetpotato genebanks holding landraces

Collection (Country)	Number of accessions	Regeneration Procedures	No. propagules used	No. accession per year	Urgent regeneration needs (%)
LAC					
INIVIT, Sto. Domingo (CUB)	332	In vitro / Stem cuttings	10 plantlets / 15 cuttings	80 in vitro 300 greenhouse	ND
INTA, Castelar (ARG)	258	In vitro / Stem cuttings	10 plantlets / 15 cuttings	250 in vitro -	0
EMBRAPA, Brasilia (BRA)	982	In vitro / Stem cuttings	10 plantlets / 15 cuttings	ND	ND
CIP, Global (PER)	4,383	In vitro / Stem cuttings	8 plantlets / 5 cuttings	3,850 in vitro 2,600 greenhouse	0
Africa					
ARI, Namulonge (UGA)	1,300	Stem cuttings	ND	ND	100
HORTI, Tengeru (TNZ)	388	Stem cuttings	ND	ND	100
IIAM, Umbeluzi (MOZ)	71	Stem cuttings	ND	ND	100
Asia					
PhilRootcrops, Leyte (PHL)	771	In vitro / Stem cuttings	10 plantlets / 10 cuttings	ND	ND
NPGRL, Los Baños (PHL)	183	In vitro / Stem cuttings	10 plantlets / 15 cuttings	50 in vitro -	100
NIAS, Tsukuba (JPN)	1,600	In vitro / Stem cuttings	15 cuttings	1,600 greenhouse	0
IABIOGRI, Bogor (IDN)	1,400	In vitro / Stem cuttings	10 plantlets / 15 cuttings	75	50
Melanesia					
NARI, Kainantu (PNG)	1,120	Cuttings	15 cuttings	1,120	50

Annex 5B: Regeneration details of 5 sweetpotato genebanks holding accessions of wild *Ipomoea* species

Collection (Country)	Number of accessions	Regeneration procedures	Number propagules used	Number accessions per year	Urgent regeneration needs (%)
LAC					
INIVIT, Sto. Domingo (CUB)	95	Botanical seed / Greenhouse	10	24	100
INTA, Castelar (ARG)	77	Botanical seed / Greenhouse	10	77	50
CIP, Global (PER)	1,160	Botanical seed / Greenhouse	20	200	25
North America					
USDA/ARS, Georgia (USA)	447	Botanical seed / Greenhouse	20	30	20
Asia					
IAS, Xuzhou (CHN)	40	Botanical seed / Greenhouse	20	40	ND

Annex 6. Sweetpotato germplasm from regions and countries represented in the Global collection held in CIP genebank.

Region/Country	Number of accessions			
	Landraces	Wild species	Other	Total
LAC				
Peru	1,789	54	520	2,563
Argentina	176	129	24	329
Colombia	212	88	0	300
Ecuador	182	724	0	254
Brazil	131	17	12	160
Paraguay	4	107	0	181
Venezuela	89	67	0	156
Bolivia	79	26	1	106
Uruguay	0	6	2	8
Chile	0	0	1	1
Caribbean	364	87	63	514
Guatemalan	143	61	0	204
Nicaragua	16	74	2	90
Mexico	46	26	1	73
Panama	45	0	1	47
Costa Rica	37	0	0	37
Honduras	12	18	0	30
North America				
USA	9	38	171	210
Africa				
Western	3	0	879	882
Middle	8	0	0	8
Northern	2	0	0	2
Southern	2	0	5	12
Eastern				
Kenya	8	0	0	8
Uganda	5	0	0	5
Burundi	4	0	0	4
Rwanda	4	0	0	4
Tanzania	4	0	0	4
Zambia	3	0	0	3
Madagascar	2	0	0	2
Malawi	1	0	0	1

Region/Country	Number of accessions			
	Landraces	Wild species	Other	Total
Asia				
Taiwan	174	0	132	306
Indonesia	104	0	3	107
Thailand	88	0	0	88
Philippines	29	2	14	45
Malaysia	10	0	0	10
Lao Peoples'	7	0	0	7
Myanmar	3	0	0	3
Singapore	3	0	0	3
Japan	10	0	102	112
China	6	0	33	39
Korea, Repl.	1	0	8	9
Hong Kong	1	0	-	1
Indian	7	0	2	9
Sri Lanka	5	0	0	5
Bangladesh	2	0	2	4
Vietnam	2	0	0	2
Melanesia				
Papua New Guinea	446	0	2	448
Polynesia	23	0	9	32
Australia/New Zeland	7	3	0	10
Total	4,383	1,160	1,977	7,520

Annex 7A: Major constraints of 31 individual sweetpotato collections.

1 = Important constraint; 2 = Intermediate; 3 = No constraint

Collection (Country)	Storage	Regeneration	Plant health
LAC			
INIVIT, Sto. Domingo (CUB)	2	2	1
INTA, Castelar (ARG)	3	2	1
EMBRAPA, Brasilia (BRA)	3	2	ND
CIP, Global (PER)	3	2	3
North America			
USDA/ARS, Georgia (USA)	3	3	3
Africa			
NaCRRI, Kampala (UGA)	2	2	2
HORTI, Tenguru (TNZ)	2	1	1
KARI, Kakamanga (KEN)	3	2	1
ISAR, Rubona (RWA)	1	2	1
ARI, Mzuzu (MWI)	2	1	2
EARI, Awasa (ETH)	2	2	1
KARI, Kumasi (GHA)	1	1	1
CIP/SSA, Kabete (UGA)	2	2	2
INERA, Mulungu (COD)	1	2	1
IIAM, Umbeluzi (MOZ)	2	1	1
Monza Res.St. (ZMB)	1	1	1
VOPI, Pretoria (ZAF)	2	1	2
Asia			
PhilRootcrops, Leyte (PHL)	2	ND	2
NPRCR TC, Benguet (PHL)	2	2	2
NPGRL, Los Baños (PHL)	2	1	2
NIAS, Tsukuba (JPN)	3	3	3
VASI, Hanoi (VNM)	2	1	1
CIP/ESEAP, Bogor (IDN)	3	3	2
IABIOGRI, Bogor (IDN)	2	2	1
IAS, Xuzhou (CHN)	3	ND	2
ICAR, Kerala (IND)	3	2	ND
MOKPO (PRK)	1	ND	2
MARDI, Selang (MYS)	2	2	2
PHRC (THA)	2	2	2
CARI (LKA)	2	2	2
Melanesia			
NARI, Kainantu (PNG)	2	2	1

Annex 7B: Major constraints of 31 individual sweetpotato collections.

1 = Important constraint; 2 = Intermediate; 3 = No constraint

Collection (country)	Characterization	Documentation	Safety-duplication
LAC			
INIVIT, Sto. Domingo (CUB)	2	2	1
INTA, Castelar (ARG)	3	3	2
EMBRAPA, Brasilia (BRA)	3	3	1
CIP, Global (PER)	3	3	3
North America			
USDA/ARS, Georgia (USA)	3	3	1
Africa			
NaCRRI, Kampala (UGA)	2	2	1
HORTI, Tenguru (TNZ)	2	2	2
KARI, Kakamanga (KEN)	2	2	1
ISAR, Rubona (RWA)	2	2	1
ARI, Mzuzu (MWI)	1	2	1
EARI, Awasa (ETH)	1	2	1
KARI, Kumasi (GHA)	2	2	1
CIP/SSA, Kabete (UGA)	2	3	2
INERA, Mulungu (COD)	1	2	1
IIAM, Umbeluzi (MOZ)	2	2	2
Monza Res.St. (ZMB)	2	2	1
VOPI, Pretoria (ZAF)	2	3	1
Asia			
PhilRootcrops, Leyte (PHL)	3	3	1
NPRCR TC, Benguet (PHL)	3	2	1
NPGRL, Los Baños (PHL)	1	3	1
NIAS, Tsukuba (JPN)	3	3	3
VASI, Hanoi (VNM)	1	1	3
CIP/ESEAP, Bogor (IDN)	3	3	3
IABIOGRI, Bogor (IDN)	2	2	2
IAS, Xuzhou (CHN)	3	2	1
ICAR, Kerala (IND)	3	3	1
MOPKO (PRK)	1	1	1
MARDI, Selang (MYS)	2	2	1
PHRC (THA)	1	2	1
CARI (LKA)	1	2	1
Melanesia			
NARI, Kainantu (PNG)	2	2	1

Annex 8A. Needs for strengthening capacities in the conservation of 31 sweetpotato collections

1 = urgent; 2 = intermediate; 3 = no need

Collection (Country)	Storage				Regeneration	
	In vitro	Field	GH(1)	CC(2)	LR(3)	W(4)
LAC						
INIVIT, Sto. Domingo (CUB)	2	3	1	1	2	1
INTA, Castelar (ARG)	3	-	-	3	3	1
EMBRAPA, Brasilia (BRA)	2	3	3	3	2	1
CIP, Global (PER)	3	3	3	3	3	2
North America						
USDA/ARS, Georgia (USA)	3	3	3	3	3	2
Africa						
ARI, Namulonge (UGA)	1	3	-	-	1	-
HORTI, Tenguru (TNZ)	-	3	1	-	1	-
KARI, Kakamanga (KEN)	-	3	3	-	2	-
ISAR, Rubona (RWA)	1	2	-	-	2	-
ARI, Mzuzu (MWI)	1	3	2	-	1	-
EARI, Awasa (ETH)	-	2	2	-	2	-
KARI, Kumasi (GHA)	1	2	2	-	1	-
CIP/SSA,, Kabete (UGA)	-	2	2	-	2	-
INERA, Mulungu (COD)	1	2	2	-	2	-
IIAM, Umbeluzi (MOZ)	2	2	2	-	1	-
Monza Res. St. (ZMB)	1	2	-	-	1	-
VOPI, Pretoria (ZAF)	-	2	2	-	1	-
Asia						
PhilRootcrops, Leyte (PHL)	2	3	2	-	-	-
NPRCR TC, Benguet (PHL)	1	3	2	-	2	-
NPGRL, Los Baños (PHL)	2	3	2	-	1	-
NIAS, Tsukuba (JPN)	3	3	3	-	3	-
VASI, Hanoi (VNM)	1	2	2	-	1	-
CIP/ESEAP, Bogor (IDN)	3	3	3	-	3	-
IABIOGRI, Bogor (IDN)	1	2	2	-	2	-
IAS, Xuzhou (CHN)	3	3	3	-	-	-
ICAR, Kerala (IND)	1	2	2	2	-	-
MOKPO (PRK)	-	2	1	-	-	-
MARDI, Selang (MYS)	-	2	2	-	2	-
PHRC (THA)	-	2	2	2	2	-
CARI (LKA)	-	3	3	-	2	-
Melanesia						
NARI, Kainantu (PNG)	1	2	2	-	2	-

Annex 8B. Needs for strengthening capacities in the conservation of 31 sweetpotato collections

1 = urgent; 2 = intermediate; 3 = no need

Collection (Country)	Plant health		Characterization	
	Testing	Eradication	Morphology	Molecular
LAC				
INIVIT, Sto. Domingo (CUB)	1	2	3	1
INTA, Castelar (ARG)	1	1	3	2
EMBRAPA, Brasilia (BRA)	-	-	3	3
CIP, Global (PER)	3	3	3	3
North America				
USDA/ARS, Georgia (USA)	3	3	3	3
Africa				
ARI, Namulonge (UGA)	2	2	3	2
HORTI, Tengeru (TNZ)	1	1	2	1
KARI, Kakamega (KEN)	2	1	2	1
ISAR, Rubona (RWA)	1	1	2	1
ARI, Mzuzu (MWI)	2	2	1	1
EARI, Awasa (ETH)	1	1	2	1
KARI, Kumasi (GHA)	2	1	2	2
CIP/SSA, Kabete (UGA)	2	3	2	3
INERA, Mulungu (COD)	1	1	1	1
IIAM, Umbeluzi (MOZ)	1	1	2	2
Monza Res. St. (ZMB)	2	1	2	2
VOPI, Pretoria (ZAF)	2	2	2	1
Asia				
PhilRootcrops, Leyte (PHL)	2	2	3	2
NPRCR TC, Benguet (PHL)	2	2	3	1
NPGRL, Los Baños (PHL)	2	3	2	1
NIAS, Tsukuba (JPN)	3	3	3	3
VASI, Hanoi (VNM)	2	1	2	1
CIP/ESEAP, Bogor (IDN)	2	3	3	3
IABIOGRI, Bogor (IDN)	1	1	3	1
IAS, Xuzhou (CHN)	2	2	3	2
ICAR, Kerala (IND)	-	-	2	1
MOKPO (PRK)	1	1	2	1
MARDI, Selang (MYS)	2	2	2	2
PHRC (THA)	2	2	2	1
CARI (LKA)	2	2	2	1
Melanesia				
NARI, Kainantu (PNG)	1	1	3	1

Annex 8C. Needs for strengthening capacities in the conservation of 31 sweetpotato collections

1 = urgent; 2 = intermediate; 3 = no need

Collection (Country)	Database	Computerization	Safety Duplication
LAC			
INIVIT, Sto. Domingo (CUB)	2	2	1
INTA, Castelar (ARG)	3	3	3
EMBRAPA, Brasilia (BRA)	3	3	1
CIP, Global (PER)	3	3	3
North America			
USDA/ARS, Georgia (USA)	3	3	1
Africa			
ARI, Namulonge (UGA)	2	1	1
HORTI, Tengeru (TNZ)	2	1	2
KARI, Kakamega (KEN)	2	1	1
ISAR, Rubona (RWA)	2	1	1
ARI, Mzuzu (MWI)	2	1	1
EARI, Awasa (ETH)	2	1	1
KARI, Kumasi (GHA)	2	1	1
CIP/SSA, Kabete (UGA)	3	3	2
INERA, Mulungu (COD)	2	1	1
IIAM, Umbeluzi (MOZ)	2	1	2
Monza Res. St. (ZMB)	2	1	1
VOPI, Pretoria (ZAF)	3	3	1
Asia			
PhilRootcrops, Leyte (PHL)	3	1	1
NPRCR TC, Benguet (PHL)	2	1	1
NPGRL, Los Baños (PHL)	3	3	1
NIAS, Tsukuba (JPN)	3	3	3
VASI, Hanoi (VNM)	2	1	3
CIP/ESEAP, Bogor (IDN)	3	3	3
IABIOGRI, Bogor (IDN)	3	1	1
IAS, Xuzhou (CHN)	3	1	1
ICAR, Kerala (IND)	3	3	1
MOKPO (PRK)	1	1	1
MARDI, Selang (MYS)	3	2	1
PHRC (THA)	3	2	1
CARI (LKA)	2	1	1
Melanesia			
NARI, Kainantu (PNG)	3	2	1

(1) Greenhouse; (2) Cold Chamber; (3) Landraces; (4) Wild species

Annex 9. Offers: Facilities and expertise that could be shared (*)

Collection (Country)	Conservation		Regeneration		Plant Health		Documentation		Safety Duplication		Total	
	F	T	F	T	F	T	F	T	F	T	F	T
LAC												
INIVIT, Sto. Domingo (CUB)		X(1)									0	1
INTA, Castelar (ARG)	X(1)	X(1)	X	X			X	X			3	3
CIP, Global (PER)	X(1)	$X^{(1)}_{(4)}$	X(1)	X(1)	X	X(1)	$X^{(2)}_{(4)}$	X(2)	X	X(1)	5	5
ASIA												
PhilRootcrops, Leyte (PHL)	$X^{(1)}_{(3)}$	X	X(3)	X			X	X	X	X	4	4
IABIOGRI, Bogor (IDN)	$X^{(1)}_{(3)}$	X	X(3)	X			X	X	X		4	3
IAS, Xuzhou (CHN)	$X^{(1)}_{(3)}$		X(3)		X		X(2)		X	X	5	1
ICAR, Kerala (IND)	$X^{(1)}_{(3)}$	X	X	X	X		X	X	X	X	5	4
Melanesia												
NARI, Kainantu (PNG)	X(1)	X(1)	X(2)	X(2)			X(2)		X		4	2
TOTAL (8 genebanks)	7	7	7	6	3	1	7	5	6	4		

(*) Means that a genebank offers facilities (F) and/or expertise for training (T) for the listed genebank functions.
(1) Includes *in vitro* culture; (2) database computerization; (3) field condition; (4) other quality monitoring tools: barcode system, workflows.

Annex 10. Pre-proposal outlined by the Participants to the Workshop: "International Consultative Workshop on Developing a Global Strategy for Ex-situ Conservation of Sweetpotato Germplasm", Manila, Philippines.

During the Manila workshop, the 22 participants were splitt into five thematic groups to outline the essential parts of five pre-proposals, each one dealing with priority themes on sweetpotato genetic resources conservation. Since the pre-proposals resulted highly interrelated they have been merged into one comprehensive proposal with five sequential projects. While the merging of the pre-proposals attempts to achieve integration, it does not preclude that every project component could be funded and be managed separately, but essential linkages would be maintained in order to enhance the partnership synergies.

Proposal: Global Partnership Program on Sweetpotato Genetic Resources
The proposed establishment of the global partnership program focuses on the immediate needs for integrating collaborative actions to approach the issues on sweetpotato conservation that have been identified and analyzed in the workshop. Also the program would link to the other ongoing global and regional activities and networks dealing with sweetpotato genetic resources.
The partnership program would bring a range of benefits to the collaboration on sweetpotato genetic resources conservation, including: promoting information sharing, technical learning and social networking among participants, fund seeking, among others.
Follow up wprkshop will be organized by projects. Contemporary sweetpotato topics will be considered and addressed in these workshops, including: opportunities and threats of sweetpotato as raw material for biofuels, purple and orange flesh sweetpotato for biofortification, sweetpotato as a fodder crop, and sweetpotato as a cash crop and its global positiond towards the future.
The program would consist in the integration of the following projects. The outlines of the 5 project pre-proposals now follow:

1. NETWORKING

Title: Development of a global network on sweetpotato genetic resources

Implementing/Coordinating Institutions: International Potato Center (CIP) should host this network and play a secretariat role both at global level (i.e. Lima, Peru) and the Regional offices in SSA, LAC and ESEAP regions.

- Focal person: Regina Kapinga (CIP, SSA); David Tay and Genoveva Rossel (CIP, Peru)
- Task force: Regina Kapinga (CIP, SSA); David Tay and Genoveva Rossel (CIP, Peru), Algerico Mariscal (Philippines) asn S.K. Naskar (ICAR, India)

Participants: Sweetpotato genetic resources collection holders based on the regions as outlined below:
- SSA region: Tanzania, Kenya, Uganda, Ethiopia, Rwanda, Mozambique, Nigeria, Ghana, Angola, Madagascar and Malawi
- APO region: Papua New Guinea, India, Oceania, Japan, S. Korea, RD Korea, Philippines, China, Vietnam. In this region, will linkage with ANSWER and UPWARD networks will be established.
- LAC region: Cuba, Brazil, Argentina, Guatemala, other Caribean countries, Ecuador, Mexico, Nicaragua, Colombia and Peru.

Time frame: Five years (2008-2012)

Objectives:
- To strengthen capacities for enhancing communication among network members.

- To make available research results and technical back-stopping actions from CIP, Bioversity International and other developed and developing country institutions.
- To enhance knowledge and updating activities regularly through the network webpage.
- To promote standard databases for the collections at national, regional and global levels.
- To promote the secure conservation of the wider sweetpotato diversity through effective use of complementary conservation strategies.
- To strengthen collaborative efforts for attracting funds to carry out these endeavors.
- To identify constraints within the network and provide solutions.

Proposed networking process:
- Launching meeting at Global then at individual Regional levels.
- Formation of the networks both at Global and Regional levels. The mother network will be known as the Sweetpotato Genetic Resources Network (SGRNET). This, at regional levels will be SGRNET- SSA, APO, and LAC respectively.
- Formation of steering committee teams will be done at both global and regional levels.
- One meeting every other year will be organized at global level and annual meetings will be held by regions.

Estimated budgets for 5 years: US $ 1,000,000

2. DOCUMENTATION

Title 2.1: Capacity building of regional genebanks on database management for sweetpotato germplasm

Implementing/Coordinating Institutions:CIP-(Africa); CIP-(Latin America); CIP/ESEAP UPWARD (Asia).
- Focal person: Maria Lea Villavicencio (Nat. PGRL, Philippines)
- Task force: Maria Lea Villavicencio (Nat. PGRL, Philippines); Anmarie Apa (NARI, Papua New Guinea); Marylis D. Milian Jimenez (INIVIT, Cuba); Robert O.M. Mwanga (NaCRRI, Uganda); Reinhard Simon and Henry Juarez(CIP, Peru)

Participants:
- Africa: Tanzania, Uganda, Mozambique, Ghana, Rwanda, Zambia, Kenya, Malawi. Ethiopia, Congo.
- Asia-Pacific: Philippines, Papua New Guinea, Xuzhou, China (*), Vietnam, Indonesia (*) PR Korea(*),
- Latin America: INIVIT (Cuba), INTA (Argentina) (*)

Note: (*) will focus on DIVA-GIS and Flora Map programs.

Time Frame: One (1) month per training period

Objectives:
1. To enhance the capacity of genebanks on database management of SP germplasm
2. To standardize protocols for documentation of SP germplasm management

Process and Activities:
1. A Regional Training of Trainers (RTOT) workshop will be conducted on database management which will last for one (1) month. It is suggested that 10-12 persons be trained for documentation and database systems management. Two training sessions can be held. Participants will be trained and familiarized with different documentation management activities and systems used for database management. For example, how to manage records of inventory, passport and characterization of sweetpotato. Similarly, participants will be taught simple diversity analysis and be familiarized on different systems used in a genebank like DIVA-GIS, Flora Map, Darwin Programs.

2. The Trainers from the Regional Training workshop will then conduct in-Country Training courses for the countries that need to establish documentation systems and protocols for database management.

Budget Components: US$

Regional Training		
Travel Cost	30,000	
Meals/Accommodation -	6,000	
Resource Persons	8,000	
Supplies	3,000	
Contingencies	3,000	
Sub-total	40,000 x 2	**80,000**
In-country Training		**20,000/country**

Total Estimated Cost: US$ 60,000/training period for RTOT and in-country training

Title 2.2: Upgrading the facilities of genebanks for database management of sweetpotato germplasm

Implementing/Coordinating Institutions:CIP/SSA (Uganda, Mozambique); CIP-UPWARD –ESEAP (Asia)
- Focal person: Maria Lea Villavicencio (NPGRL, Philippines)
- Task force: Maria Lea Villavicencio (NPGRL, Philippines); Anmarie Apa (NARI, Papua New Guinea); Marylis D. Milian Jimenez (INIVIT, Cuba); Robert O.M. Mwanga (NaCRRI, Uganda); Reinhard Simon and Henry Juarez(CIP, Peru)

Participants:
Cuba, Mozambique, Tanzania, Uganda, South Africa, Angola, Ethiopia, Kenya, Malawi, Congo, Papua New Guinea, Philippines, India, China, Indonesia, Vietnam, PR Korea

Time Frame: One (1) Year

Objectives:
- To upgrade and improve facilities of genebanks through rehabilitation and renovation of infrastructure and installing and/or purchasing new equipment for documentation.

Process and Activities:
1. Designated rooms for database documentation and records management will be rehabilitated or renovated. For those genebanks without designated rooms, a new room will be made available.
2. New computers with high capacity for storing large data will be acquired.
3. Registered computer software will be acquired and installed.

Budget Components: US$

Africa	100,000
INIVIT	15,000
NARI, Papua New Guinea	15,000
NPRCRTC, Philippines	15,000

Total Estimated Budget (1 year): US$ 145,000

Title 2.3: Development of a global database network for sweetpotato genetic resources

Implementing/Coordinating Institute: CIP (Peru)
- Focal person : Reinhard Simon (CIP, Peru)

- Task force : Reinhard Simon (CIP, Peru); Maria Lea Villavicencio (NPGRL, Philippines); Anmarie Apa (NARI, Papua New Guinea); Marylis Diley M. Jimenez (INIVIT, Cuba); Robert O.M. Mwanga (NaCRRI, Uganda) and Genoveva Rossel (CIP, Peru)

Participants: All sweetpotato germplasm holders

Time Frame: 3 years (2 years for the development/establishment of network; one (1) year for the implementation

Objectives:
- To develop a Global Database Network for sweetpotato and facilitate information exchange among network members.

Process and Activities:
1. The establishment of a sweetpotato global network will be initiated by CIP, Lima as they have an existing database system for potato that can be adopted for sweetpotato. The system will be regionalized to accommodate slowly other members of the network, in other regions.
2. The priority data for exchange will be the passport data, characterization and evaluation data.
3. It is also important that export system for exchange be developed and established. This can be a knowledge-base system.

Budget Components: US$
- Program development
- Purchase of software
- Consultants/Computer Programmer Fees
- Implementation (Regional, Global)

Total Estimated Cost: US$ 150,000 (US$50,000/year)

3. REGENERATION, CONSERVATION AND SAFETY DUPLICATION

Title: Regeneration, conservation and safety duplication of sweetpotato genetic resources in Asia, Africa and Latin America.

Implementing Coordinating/Institutions: ILETRI (Indonesian Legumes and Tuber Crops Research Institute), Indonesia for Asia; NaCRRI (National Crops Resource Research Institute), Uganda for Africa; INIA (National Institute of Agricultural Research), Peru for Latin America.
- Focal person: Muhammad Jusuf Yakub (ILETRI, Indonesia).
- Task force : Muhammad Jusuf Yakub (ILETRI, Indonesia); Robert O.M. Mwanga (NaCRRI, Uganda); Daniel Reynoso (INIA, Peru); G.Rossel (CIP, Peru).

Participants: ILETRI, Indonesia; IBIOGRI, Indonesia; XSRC, China; UPLB, Phillipines; NPRRTC, Philipines; UPWARD, Phillipines; PRCRTC, Phillipines; CTRI, India; NARI, Papua New Guinea; INIVIT, Cuba; CIP/SSA; HRI, Tanzania; CIP Lima, Peru; INTA, Argentina; CIP/Mozambique.

Time Frame: 2008-2012

Objective
- To regenerate, conserve and safety duplicate sweetpotato genetic resources in Asia, Africa and Latin America.

Expected Outputs

- Landraces and wild related species will be made available as highly viable accessions.
- Trained staff and infra structure improved for germplasm conservation, including *in vitro* and advances on cryopreservation.
- Safety duplicated of germplasm collection in other genebanks.

Process and Activities

1. Urgent regeneration of existing wild species and landraces germplasm accessions in the genebank.
   Regeneration will take place both in the field and/or greenhouse through roots sprouts and cuttings, but also in laboratory through *in vitro* culture.

2. Sustaining activity on regeneration.
   To ensure the long-term conservation strategy and sustainable availability of sweetpotato genetic resources.
   To regenerate the planting material of each accession to guarantee the existence of the germplasm collected and its safety duplication.
   To strengthen cooperation and capacity among national and regional programs and international institutions on sustainable *ex situ* conservation.
   Capacity building and strengthening conservation and management of sweetpotato genetic resources.
   Topics to include: Germplasm conservation (field, screen house, glass house, *in vitro*); cryopreservation will be included and implemented through collaboration with CIP, Peru and relevant advanced group(s). The proposed training will be done in Indonesia for Asia, in Lima (Peru) for Latin America and in Uganda for Africa. Investigation will be extended to study the cultural practices and farmers' knowledge about the management of local cultivars.

3. Curators have to identify the areas where unique germplasm still exist for future collecting.
   To cooperate and promote the development of an efficient and sustainable system of *ex situ* conservation.

4. Conservation of germplasm:
   To develop an efficient, economically and sustainable system for *ex situ* conservation.
   To increase the efficiency and effectiveness of *ex situ* conservation, including *in vitro* storage.
   To explore the application of cryopreservation for the long-term storage conservation of sweetpotato germplasm.

Implementation:

Year 2008

- Validate information on regeneration and safety duplication needs generated in the Manila workshop: Asia, Africa, and LAC.
- Identify and prioritize regeneration activities: Asia, Africa, and LAC.
- Seek and establish partnerships/services and provide of facility/expertise: availability for regeneration and safety duplication of collections; in Asia, Africa and LAC.

Year 2009

- Capacity building (human resources and infrastructure) for regeneration activities: field, greenhouse, *in vitro* in Asia, Africa, LAC genebanks.
- Initiate regeneration and safety duplication work: Asia, Africa, LAC

Year 2010

- Continue regeneration and safety duplication work: Asia, Africa, LAC.
- Extend training of local technical personel on regeneration work: Asia Africa, LAC

Year 2011

- Capacity building (human resources and infrastructure) for conservation: Asia, Africa, LAC
- Implement complementary efficient cost effective conservation of landraces and wild relatives: field, greenhouse, *in vitro*.

Year 2012

- Sustain activities on regeneration and safety duplication: Asia, Africa, LAC
- Sustain activities on conservation: Asia, Africa, LAC

Total Budget

$ 900,000

1. Regeneration…….$ US 280 000,-
2. Safety duplication…….$ US 80 000,-
3. Conservation…….....$ US 300 000,-
4. Capacity building
   - Training……$ US 160 000,-
   - Infrastructure ……$ US 80 000,-

T o t a l	$ US 900 000,-

4. PLANT HEALTH

Title: Upgrading capacities to enhance the health status of sweetpotato priority collections

Implementing/Coordinating Institutions: INIA (Peru),INTA (Argentina), NPRRTC (Philippines), CIP (Peru)

- Focal person: Daniel Reynoso (INIA, Peru)
- Task force: Daniel Reynoso (INIA, Peru), Norma Hompanera (INTA, Argentina), Maria Andrade (IIAM, Mozambique), Ines Gonzales (NPRRTC, Philipines), I. Barkert and A. Panta (CIP, Peru).

Participants: INIVIT, Cuba; INTA, Argentina; HORTI, Tanzania; ISAR, Rwanda; EARI, Ethiopia; INERA, Congo; IIAM, Mozambique; IBIOGRI, Indonesia; Mopko, PR Korea; VASI, Vietnam; NARI, Papua New Guinea; INIA, Peru; NPRRTC, Philipines; KARI, Ghana; CIP, Peru.

Objective:

- To train curators on technologies to conserve and distribute sweetpotato accessions free from diseases and pests.
- To improve infrastructure, equipment and supplies to enhance health status of sweetpotato collections.

Time Frame: 3 years

Process and activities

1. Assessment of health status of sweetpotato collections, facilities and training needs in sweetpotato genebanks.
2. Implementation: Training and improving facilities.

Budget components

1. Training from 15 countries: Asia, Africa, LAC.
   Total $ 142,500
2. Facilities

Supplies	$50,000
Equipment	3,000

Total 53,000

3. Infrastructure

Asia)
Africa) $150,000
Latin America)
Total Budget fro 3 years: US $345,500

5. CHARACTERIZATION AND UTILIZATION

Title: Globally coordinated programme for the characterization and utilization of sweetpotato genetic resource

Coordinating/implementing institutions: CIP, Lima Peru; HORTI, Tanzania; IAS, Xuzhou, China.

- Focal person: Stephen Kuoko Sebastiani (HORTI, Tanzania)
- Task Force: Stephen Kuoko Sebastiani (HORTI, Tanzania), Hongmin Li (IAS, Xuzhou, China); Genoveva Rossel (CIP, Peru).

Participants: HORTI, Tengeru (Tanzania); UPLB (Philippines); IAS, Xuzhou (China); Namulonge (Uganda); INTA (Argentina); INIVIT (Cuba); ILETRI (Indonesia); ICAR (India); NARI (Papua New Guinea); CIP (Peru).

Time frame: 2008-2012

This project is based on the characterization of existing collections to develop a framework for the utilization of promising germplasm for their potential contribution to existing sweetpotato gene pool.
There is a need to develop the best strategy to conserve and utilize sweetpotato collections. These collections need to be rationalized to improve and make their management efficient and cost-effective. In addition, there needs to be further characterization and evaluation of collections outside the region/country of origin.

General objectives

- To develop and implement appropriate programmes for enhanced conservation and utilization of sweetpotato genetic resources.

Specific objectives

- To develop a framework for a coordinated programme for the characterization, and utilization of sweetpotato collections.
- Identification of elite and diverse germplasm for crop improvement programmes.
- Institutional capacity and human resources development.

Purpose

To improve and strengthen national, regional and global capabilities in sweetpotato genetic resources conservation and utilization; thereby contributing to improve food security and sustainable economic development in developing areas of Asia, Africa and LAC.

1. Characterization

- **Activity 1.1:** Use molecular markers to assess the genetic diversity of sweetpotato in the region.
- **Activity 1.2**: Morphological characterization of germplasm using the CIP/IPGR descriptor. The aim is to identify redundancies and develop strategies for their efficient conservation and use.

2. Utilization

- **Activity 2.1**: Facilitate the movement and safe exchange of germplasm within and outside the region: use of Material Transfer Agreements.
- **Activity 2.2**: Identify germplasm with: high dry matter content, adaptation for table and processing, phenotypic variation – leaf, storage root shape, skin and flesh colors, sizes.
- **Activity 2.3**: Assess the potential of sweetpotato germplasm for human and animal nutrition and health
- **Activity 2.4**: Diverse germplasm available to farmers, development organization, and scientists for direct use, enhancement and improvement.

3. Conservation and maintenance
- **Activity 3.1**: Develop protocols for enhance of *in vitro* germplasm maintenance and mass multiplication.
- **Activity 3.2**: Develop and optimize cryopreservation protocols for sweetpotato, as the most effective and safe, long-term conservation method
- **Activity 3.3:** Develop linkages of *ex-situ* with on-farm conservation.

4. Capacity development

Development of a regional capacities based on the needs identified in this strategy.
- **Activity 4.1**: Validate the information at national, regional and global human and physical capacity and training needs.
- **Activity 4.2**: Regional training on sweetpotato characterization methods and tools.
- **Activity 4.3**: Regional training on sweetpotato *in vitro* conservation and safe international transfer of germplasm.

Expected outputs
- Global framework for a coordinated programme on the characterization, and utilization of sweetpotato genetic resources in place.
- Sweetpotato germplasm available worldwide.
- Institutional capacities and human resources on germplasm characterization.
- Sweetpotato cryopreservation protocols advanced.
- Global framework for germplasm exchange in place.

Budget:
- Characterization (molecular and morphological): USD 250,000.
- Institutional capacity building – laboratory supplies and facilities: USD 200,000.
- Conservation (cryo-) and maintenance: USD 200,000
- Human resources capacity building - training, workshops, conference: USD 200,000

TOTAL (Tentative) for 5 years: USD 850,000