Global Strategy for the *Ex situ* Conservation of Potato

Date: July 2006

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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 potato.

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This strategy document is expected to continue evolving and being updated as and when information becomes available. The Trust therefore acknowledges this version dated July 2006.

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

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Executive summary

Worldwide no more than 30 important potato collections can be identified, maintaining approximately 65,000 accessions. Potato genetic resources are conserved as botanical seeds or vegetatively as tubers and *in vitro* plantlets. Conservation of vegetatvely propagated material is more complicated and expensive than conservation of crops that can be easily maintained in the form of seed. The health status of both vegetative material and botanical seed is important as a condition for the distribution of the material, in particular with a view of the relevant plant quarantine regulations.
This proposal for a "Global Conservation Strategy for Potato" is, inter alia, based on a questionnaire completed by 23 potato genebank holders, and on the "Workshop of Potato *Ex situ* Collection Curators" organised from August 24-26 at CIP, Lima. All major potato genebanks returned the questionnaire. In addition, information from the literature and from potato databases has been studied. It is estimated that approximately 90 % of the global potato genetic resources collections is represented and included in the subsequent analysis.

Potato collections
The major potato collections are situated in Latin America, in the centre of diversity of potato germplasm, and in Europe, North America and few countries in Asia. The 23 analysed collections maintain a total of nearly 59,000 accessions (Table 1). Eleven collections maintain more than 2000 accessions per collection, and together conserve 86 % of the total gene pool. The other 12 potato collections conserve smaller numbers of accessions varying from 64 to 1843 accessions. Detailed information on the composition and size of the 23 collections is presented in Annex 4, Table 2. Data show that large differences exist in the type of potato germplasm conserved by the different genebanks, the collections in Latin America containing many native cultivars and wild relatives, and the collections in Europe and North America containing modern cultivars and breeding materials, as well as wild relatives. Most collections in Latin America are threatened because of lack of funding and qualified staff. In one country, the potato collection was recently reduced by 50% because of lack of funding. Curators indicated that their collections will not increase to a large extent in the near future; only five curators of relative small collections expect an increase of 20% or more.

Management of potato genetic resources
The responses to the questionnaire revealed that PGR management practices between the gene banks differ considerably for some of the more critical genebank functions. Most genebanks adequately conduct less expensive and less complex functions such as acquisition, classification, characterisation, evaluation and distribution of germplasm. The functions regeneration, documentation, storage, health control and safety duplication, all critical activities for optimal conservation, are not adequately performed in a number of genebanks. The latter functions are discussed below.Only few genebanks have procedures for all or most genebank functions and only one currently operates under a certified quality management system.

Regeneration. This is one of the most critical functions in the conservation of genetic resources. The responses to the questionnaire revealed the following constraints:
an urgent need for the regeneration of 3600 accessions of wild species in 12 collections, and 6000 accessions of native cultivars of the centre of diversity, also in 12 collections; a loss of genetic information will occur by regeneration based on less than 20 plants; only six genebanks regenerate wild species using more than 20 plants, the other nine using less than 20 plants and two using even less than 10 plants;

Documentation. Although 22 genebanks stated that they use computerised information systems to manage collection data, it was often mentioned that electronic documentation

was only partly completed. In general, passport data are more completely computerised than data on characterisation, evaluation and internal genebank management. The international potato databases of APIC and ECP/GR, containing passport data, are far from complete, and are lacking in particular data of collections in Latin America and Asia. Characterisation and evaluation data are not included in the international databases at all, and only few genebanks provide this type of information through their own websites. Improvement of these databases will substantially contribute to a better management, conservation and utilization of potato germplasm.

Storage. Facilities for *ex situ* conservation and storage are generally adequate for those collections maintaining botanical seeds. Only some banks in Latin America need to upgrade this type of facilities. The storage conditions of tubers vary enormously, particularly for temperatures and relative humidity in the cold stores. Therefore standardisation is highly recommended. Several genebanks (Latin America and Russia) report not to have optimal facilities for storage of vegetative material; their facilities need to be upgraded.

Health status. Seed-borne diseases in true seeds and virus infections of tubers seriously restrict distribution of potato germplasm. Seventeen genebanks report to have problems in securing a sufficient health status of their germplasm. The eradication of viruses from tubers of cultivated potato material is a remittent need, since cleaned germplasm often gets infected again after a certain period. Several genebanks in Latin America and Russia do not have (access to) sufficient experience or facilities to keep the potato germplasm healthy.

Safety duplication. Eighteen curators indicated that their collection has been partially or completely safety duplicated elsewhere. It is not clear in sufficient detail how many accessions of potato are currently safety duplicated. It is recommended to investigate and update – if needed - the level of safety duplication once the databases have been improved.

Networks in potato genetic resources
Few networks and partnerships exist, one international network (APIC), a regional network (ECP/GR), and a set of institutional partnerships coordinated by CIP. The networks are not heavily formalised and meet often on an *ad hoc* basis. Participants at the Lima workshop expressed their interest to extend and broaden the networks in a new setting following the outline of APIC, but with more partners.

Utilisation of collections
The substantial amount of potato germplasm distributed to users indicates that germplasm is extensively used. There are, however, large differences in distribution between genebanks, ranging from a distribution from 23 to 7,630 accessions per year. Unfortunately, it appears not to be common practice for users to return information of the evaluation of the requested germplasm to the providing genebank.

Priority selection
The Lima workshop discussed the existing networks in potato germplasm, the constraints in important genebank functions and the possibilities for future cooperation. During the workshop a Consortium for global conservation of potato genetic resources was established in which representatives of all 13 genebanks present in Lima will participate. An advisory group of the Consortium was established that may also support the Trust at its request .
In establishing priorities for a rational system qualifying for support by the Trust, it was assumed that assistance may be provided in the form of either support to collaborative projects of several genebanks, or alternatively, support for capacity building and upgrading of individual genebanks to correct apparent constraints regarding facilities and training.

Recommendations for support
Support for capacity building and upgrading of seven genebanks in Latin America (6) and Russia is recommended, based on an analysis of their needs. Support should focus on documentation, conservation standards and rationalisation. The motives for this selection have been elaborated in the report. The total costs of these three proposals still have to be further detailed; the pre-proposals need further elaboration and this could be achieved during the Solanaceae meeting to be held from 23-28 July 2006. It is assumed that counterpart contributions can be made available to some extent. The constraints mentioned by the six genebanks in Latin America could not be locally assessed, and this recommendation is based on the information provided by the curators. Further work needs to clarify to which extent support for facilities is required. With regard to training in important genebank functions, CIP and genebanks in Europe and North America are willing to play a role in providing such training.

Conclusion
In summary, it can be concluded that 23 major potato collections together contain a large part of the global potato gene pool. Herewith, the basis for a rational potato conservation system exists. However, the system can be substantially improved if the performance of critical gene bank functions, i.e. regeneration, documentation, storage, health control and safety duplication, can be improved.

Global Conservation Strategy for Potato – 07/07/2006

1. Strategy Development Process

1.1 Focal person coordinating the strategy development process:
Loek van Soest
Centre for Genetic Resources, The Netherlands (CGN),
P.O. Box 16, 6700 AA Wageningen, The Netherlands
Fax: +31 317 418094 (CGN)
Email (office): loek.vansoest@wur.nl
Email (home): loek.van.soest@hccnet.nl

1.2 Contributors to the strategy development process
See list of potato collection curators having completed the questionnaire – Annex 1
Advisors: Dr. L. Visser (CGN), Dr. W. Roca (CIP) and Ir. R. Hoekstra (CGN)

1.3 Experts consulted in the development of the strategy
Curators of 13 globally relevant potato collections were invited to participate in the "Workshop of Potato *Ex situ* Collection Curators" organized from August 24-26 at CIP, Lima, hereafter referred to as Lima workshop (See program of the workshop and list of participants – Annex 2a and 2b).

2. Purpose and objectives of the potato conservation strategy

Purpose
To contribute to an efficient and effective conservation system for potato genetic resources

Objectives
- To identify collections qualifying for long-term support by the Global Crop Diversity Trust, including their urgent upgrading and capacity building needs.
- To improve collaboration between the relevant holders of potato genetic resources collections globally

3. Expected outputs

- An assessment of the status of potato collections and a widely supported analysis of their importance at the regional and global level.
- An agreement on best practices for the management of potato collections.
- Strengthened collaboration between the major collection holders through the establishment of a "Global Consortium for Potato Conservation".
- A detailed proposal for a global strategy for *ex situ* conservation of potato, based on the principles of collaboration and sharing of responsibilities, facilities and tasks, and resulting in rationalization of conservation efforts at regional and global levels, including a proposal for funding priorities.

4. Followed approach

This draft global strategy has been developed in consultation with the major potato collection holders worldwide. The strategy will have to be harmonized with relevant regional conservation strategies that are still under development, and is expected to be implemented in consultation with representatives of the relevant networks, institutions and other stakeholder groups.

The following steps to develop this draft global strategy have been undertaken:

1. Establishment of contacts with the relevant collection holders and existing PGR networks to inform them about the plan for a strategy and to ask for their participation in the process; payment of visits with the same purpose (see Annex 8).
2. Inventory of basic information and relevant data on the collections from major stakeholders by means of:
   - a questionnaire, sent to 35 potato collection holders, to establish the current state of potato conservation; through this questionnaire holders of potato germplasm have been consulted on the modes of operation regarding their collection;
   - a literature search including through Internet
   - personal correspondence with relevant curators.
3. Analysis of compiled data in preparation for the Lima workshop; assessment of the global status of potato genetic resources conservation; major constraints identification; assessment of the current level of collaboration between collection holders in view of the necessary safeguarding of potato genetic resources at the regional and global level.
4. Organization of the Lima workshop on the global potato conservation strategy and on best practices for the long-term *ex situ* conservation of potato, in cooperation with CIP (Annex 2); participation by curators of major global potato collections.
5. Identification of collections of major relevance for a rational system for the conservation of potato germplasm at the global level.
6. Identification of priorities for capacity building and upgrading needs to be submitted for support by the Trust.
7. Identification of issues qualifying for recommended best practices for the long-term *ex situ* conservation of potato.
8. Evaluation of options for collaboration, sharing of responsibilities and rationalization between potato collections at the regional and global level.
9. Establishment of a consortium of potato genetic resources curators.
10. Development of five pre-proposals by the Lima workshop participants; selection of focal persons for these pre-proposals; further prioritization of three pre-proposals for elaboration.
11. Development of a first draft for the global potato conservation strategy.
12. Distribution of a first draft for this strategy for comments by the Trust Secretariat and the potential participants in the “Global Consortium for Potato Conservation”.
13. Distribution of a revised draft sent for comments to a selected number of stakeholders.
14. Submission of the final proposal for a Global Potato Conservation Strategy to the Trust, including a proposal for funding prioritized activities.

The elements 1 through 10 mentioned above were extensively addressed at the consultation Lima workshop.

5. State of the art of potato conservation at the global level

5.1 Potato taxonomy

The potato genepool can be subdivided in four types of germplasm:

1. Wild relatives, composed of the genepool of wild tuber-bearing species and a few non-tuber producing species, occurring in the centre of diversity. Different taxonomic schools distinguish between 180 to more than 200 wild species. Hawkes (1990) divided the subgenus *Petota* of the genus *Solanum* in two subsections, i.e. *Estolonifera* with two series and Subsection *Potatoe* with 19 Series. He listed 179 species with ploidy levels of 2x, 3x, 4x, 5x and 6x (x=12) respectively. Spooner *et al.* (2005) argue on the basis of AFLP analysis for a considerable reduction of the number of species in the *S. brevicaule* complex that now contains some 20 species. In Eastern Europe a somewhat different taxonomic system based on the Russian potato researchers Bukasov, Juzepczuk and

Lechnovich has been used, describing over 200 wild potato species. Spooner and Hijmans (2001), Hijmans *et al.* (2002), and Spooner et al. (2005) listed 199 different wild potato species (*Solanum* section *Petota* and three out group relatives of the section *Etuberosum*).

2. Native cultivars, including local potato cultivars occurring in the centre of diversity. The two taxonomic schools describe eight (Hawkes, 1990) and 12 species (Russian taxonomists (Bukasov, 1971 and Lechnovich, 1971) respectively, with ploidy levels at 2x, 3x, 4x, and 5x (x=12). Alternatively, Spooner and Hijmans (2001) distinguish seven species of native cultivars.
3. Modern cultivars of the common potato (*Solanum tuberosum* subsp. *tuberosum*), the most cultivated potato subspecies in the world. This genepool includes both old and new varieties.
4. Other germplasm or research material; all types of genetic stocks e.g. inter-specific hybrids, breeding clones, genetically enhanced stocks, etc.

5.2 Data collecting

The assessment of the state of the art of potato conservation at the global level is based on the analysis of 23 responses to a questionnaire. Thirty-five copies of the questionnaire were mailed to the same number of contacts (potato collection curators) in 30 different countries. Twenty-three contacts in 22 countries returned a completed questionnaire (66 %), which van be considered a high response. Approximately 90% of the global potato genetic resources holdings, including those of the six largest potato genebanks, was thus included in the assessment. Besides general questions, questions related to the collection size and type of material maintained, collection management procedures, conservation practices, evaluation and use of the germplasm, and policies with regard to access conditions were included. Data obtained from the 23 completed questionnaires have been compiled in 13 tables (Annex 4). Information obtained from the questionnaire was complemented by discussions wit respondents during the Lima workshop and information obtained from potato networks and databases, as well as from the scientific literature.

5.3 An analysis of major collections

The 23 analysed potato collections contain a total of nearly 59,000 accessions (Table 1). Wild species form the largest group of accessions, although it is known that there is a high level of duplication in this group (see Table 2, Annex 5). Germplasm of the native cultivars from the centre of diversity in Latin America forms a second major category. This germplasm is largely vegetatively conserved in field genebanks and *in vitro* collections, whereas in some collections held in regions outside Latin America these native cultivars are maintained in the form of true seed.

Detailed information on the composition and size of the 23 collections is presented in Table 2 (Annex 4).

Table 1. Composition and size of 23 potato collections analysed

Germplasm Type/numbers	Wild species	Native cultivars of centre of origin	Modern cultivars	Other PGR*	Total***
Number of species held	151/192**	8/12**	1	N.A.	N.A.
Number of holding collections	17	17	19	18	23
Number of accessions held	**17,579**	**17,073**	**10,981**	**13,331**	**58,964**

***** inter-specific hybrids, research materials and breeding lines
** depending on the taxonomic school
*** most collections contain more than one germplasm type

Wild species. The Association of Potato Inter-genebank Collaborators (APIC) maintains a database of wild species, including eight important potato holdings, listing 13,576 accessions in total (Table 2, Annex 5). Analysis of the APIC database showed that these eight collections maintain 6961(51%) unique accessions (personal communication Roel Hoekstra, CGN).This database still lacks approximately 4,000 accessions of wild species maintained in an additional set of nine potato collections that have not yet been included in this database, as well as recently introduced material added to the eight included collections.

Native cultivars. The ECP/GR database of native cultivars of the centre of diversity includes presently 6,174 accessions held in seven European countries (Table 1, Annex 5). Other major collections are those of the ARS-NP6 (USA) and CIP (Peru), which conserve an additional set of 4,876 accessions of native cultivars. The latter accessions are included in the databases of these two collections. Approximately 6,000 accessions of native cultivars, maintained in 11 collections, particularly held in Latin America, are not yet documented in an easily accessible database.

Modern cultivars. Nineteen potato genebanks maintain together 10,981 accessions of *Solanum tuberosum* spp. *tuberosum*). The ECP/GR Working Group on Potato maintains a database with passport data of 14 of these collections. (Hoekstra and Carnegie, 2001; Hoekstra *et al*, 2001). This database is maintained by the Scottish Agricultural Science Agency (SASA, UK) and includes over 9,700 accessions of cultivars of *Solanum tuberosum* spp *tuberosum* (Table 4, Annex 5).

Other PGR. 18 collections contain more than 13,000 accessions of other PGR (inter-specific hybrids, research material and breeding lines). The other PGR types of potato germplasm mainly feature specific combinations of genes of the potato gene pool and should be considered as working collections for breeders. Both this type of potato germplasm and modern cultivars are important for breeding programmes. Their conservation is not really in danger. This germplasm is often duplicated in other collections.

5.4 Current potato genetic resources conservation

5.4.1 Recent acquisition and future collecting

The questionnaire provides information on efforts towards acquisition of new potato genetic resources over the last 10 years (Table 3, Annex 4). Genebanks introduced over 14,000 new accessions in total. In particular, germplasm of *Solanum tuberosum* spp. *tuberosum* and research materials were introduced (70%), whereas the level of introduction of new accessions of wild species (21%) and native cultivars (9 %) was much lower. The following explanations are offered:

- *Solanum tuberosum* spp. *tuberosum* is the most common potato and breeders prefer well-adapted germplasm or research material with interesting properties;
- the number of collecting expeditions in the centre of diversity were very limited during the last 10 years when compared to earlier decades;
- with the exception of some genetic gaps most wild material had been collected earlier on.

Twenty-one out of 23 potato curators indicated that their collections exhibit some gaps and most intend to organise future collecting missions (in the centre of diversity and/or the own country) or to introduce germplasm from other genebanks to fill these gaps.
It appeared that 30 wild species approximately are not yet represented in the collections and may still need to be collected. In addition, for another 25 wild species, only less than three accessions are present in the collections (see Table 3, Annex 5). Hijmans *et al.* (2002) present in the "Atlas of Wild Potatoes" information on the eco-geographic distribution of wild relatives of potato in the centre of diversity.

In line with the information provided above, the response to the question on the expected increase of collection size over the next five years was as follows (Table 3, Annex 4):

- Same size: 6 collections
- 5-10 % increase: 12 collections
- 20 % increase: 5 collections

Several potato curators stated that whereas they plan to extend the collections with new germplasm to fill remaining gaps they consider simultaneous rationalization of part of their collections.

5.4.2 Regeneration

Regeneration of wild relatives of potato
To maintain accessions of wild relatives of potato, ten genebanks regenerate the accessions as populations and produce true seed for each accession, whereas five genebanks with relatively smaller collections maintain these wild species vegetatively by means of *in vitro* conservation (Table 4.1, Annex 4). Most genebanks producing true seed base the regeneration on 10 to 20 plants per population, three are using 20 to 30 plants and two less than 10 plants only. The last option results in a high probability to lose genes present in the population due to genetic drift.

The joint annual regeneration capacity of wild species maintained in the form of true seed is approximately 1,400 accessions. In addition, 930 accessions are maintained *in vitro.* Based on the provided information (data for the percentage of accessions that needs urgent regeneration), it is estimated that conservation of 3,600 accessions of wild species approximately out of a total of 17,000 is threatened. The number of threatened unique accessions is probably much lower (< 2000 accessions), assuming a substantial duplication rate between collections.

Regeneration of native cultivars
Seventeen genebanks conserve native cultivars of potato in their collections. Most of these genebanks (12) maintain these native cultivars vegetatively (in the form of tubers in the field or *in vitro*). In addition, five collections outside Latin America maintain this type of germplasm in the form of populations. The latter method conserves the genes in the population but does not maintain the original genotype (cultivar). A few genebanks use both methods (Table 4.2, Annex 4).

In general, 15-30 tubers are used for field rejuvenation of tuber material mostly obtained from 10-20 plants. For *in vitro* conservation maintenance of 10 plantlets is the most common practice. The annual regeneration capacity of native cultivars is c. 5000 accessions (mainly through vegetative propagation; only 500 accessions are maintained by true seeds).

Based on the provided information regarding the percentage of accessions that needs urgently regeneration, it is estimated that the conservation of 6,000 accessions of native cultivars approximately out of a total of 17,000 is threatened. Again, this figure is probably much lower (< 3,000 accessions), if duplication between collections is considered.

Regeneration of modern cultivars and other PGR
Nineteen genebanks maintain modern cultivars and 18 collections conserve various types of germplasm of breeding stocks and research material. In general this type of material is vegetatively propagated, in the form of tubers or *in vitro*. Part of the breeding stocks and research material are also regenerated as populations in the form of true seeds. There is no information on the urgent need for regeneration of accessions in these two groups that number a total of respectively 11,000 and 13,000 accessions. However, this type of material is probably threatened to a minor extent, considering the general availability of funds to the collection holders concerned, and it is known that a substantial level of duplication exist in the European collections (Hoekstra and Carnegie, 2001).

5.4.3 Identification and classification of potato germplasm

The taxonomic description of wild species and native cultivars is important for the utilisation of the material in research and breeding. The quality of current description data for potato germplasm is adequate, be it with a few exceptions. Twelve collections state that practically all material has been described, whereas 10 mention that a small part has not yet been classified (Table 5, Annex 4). However, some caution is warranted. It should be mentioned that many potato genebanks have no direct support from a potato taxonomist and that the number of experienced taxonomists in the world is presently dwindling.
Accessions of native and modern cultivars have in particular been described for agromorphological traits (characterization). Different types of descriptor lists have been used, but the descriptor lists of IPGRI and UPOV are most frequently used (Table 5, Annex 4). The UPOV list has mostly been developed for description of modern potato cultivars, whereas the IPGRI list covers all types of potato germplasm. Several genebanks have been using their own (minimal) lists, often derived from these two most commonly used lists.

5.4.4 Evaluation of collections

Germplasm of 20 potato collections has been evaluated for certain properties. In 14 genebanks, evaluation is conducted on a more regular basis (systematic), whereas six mention that evaluation of the collection takes place on an *ad hoc* basis (Table 6, Annex 4). Screening for resistances to pest and diseases is conducted on germplasm of 16 collections, testing for different quality properties was conducted on material of 12 collections, and 10 genebanks evaluate for agronomical traits including yield (Table 6, Annex 4). Less common evaluation includes screening for abiotic stresses and other properties (e.g. molecular characters, anti-oxidant levels). More details on the evaluations conducted in different genebanks are presented in Table 6 (Annex 4).

5.4.5 Documentation and access to information

Documentation of the obtained information is a prerequisite for the management and utilisation of collections. Twenty-two potato genebanks state that they use information systems for the computerised storage of collection data. Table 7 (Annex 4) provides an overview of the type of data (passport, characterisation/evaluation and collection management data) stored in information systems. Computerised information storage is reported as follows:

- 19 collections have been completely or partly computerised for passport data;
- for 20 collections characterisation/evaluation data have been computerised, of which 14 only partly;
- 18 collections have computerised management data, but 12 only partly.

Documentation of evaluation data is not yet common practice and only a few potato collections make these data available on the Internet.

Access through Internet

Passport data of the collections of wild species of 10 major genebanks are accessible through the Internet (Table 12, Annex 4). The passport data of native cultivars of nine collections, and cultivars of *Solanum tuberosum* spp. *tuberosum* of 15 collections (mainly from Europe of which some holders did not complete the questionnaire) can also be found on the Internet. (Tables 1 and 4, Annex 5)) Only few potato collections make characterisation and evaluation data available on the Internet. However, as outlined in the paragraphs 5.4.8 and 5.6, various external stakeholders regularly make use of the evaluation data available in the few on-line searchable databases.

5.4.6 Storage and maintenance (true seeds, tubers and in vitro).

Storage methods of potato germplasm depend on the type of germplasm. Wild relatives are generally stored in the form of true seeds. Occasionally, native cultivars of the centre of diversity are also stored as populations (true seeds), but this is no general practice in the Latin American region.

Fifteen genebanks maintain *ex situ* storage facilities. Ten collections have long-term storage facilities (-10 to –20 ºC) and nine have medium-term facilities for true seed conservation. Five genebanks have both facilities for storing the base collections under long-term conditions and keeping the active collections under medium-term conditions (Table 8, Annex 4). The type of packaging of seeds in *ex situ* genebanks varies, several holders use aluminium foil bags, but plastic, paper bags and bottles are used as well.

The native cultivars and germplasm of *S. tuberosum* spp. *tuberosum* cultivars are normally vegetatively conserved; both seed potato and *in vitro* storage are employed.

The conditions of seed potato storage in cold rooms vary considerably. Temperature in the cold stores varies from 2 to 14 ºC, 13 genebanks using 4 ºC facilities. The relative humidity in the cold stores varies from 30 to 95 %; most common RH is around 70 %. Seventeen genebanks have *in vitro* facilities for storage of cultivated material, whereas occasionally accessions of wild species are stored *in vitro* as well. Cryopreservation is not a common practice yet, although two genebanks conduct research to further develop this method further for cloned material.

5.4.7 Health of potato germplasm

Distribution of potato germplasm, a common practice for most genebanks (see 5.4.8), is regularly hampered by infection of the germplasm. Potato germplasm can be infected by a substantial number of pathogens. The two most common and types of infection harmful for distribution are:

- seed-borne viral diseases (only relevant for true seed collections), in particular PSTVd and PVT, in Europe also PMT, PVR, APLV, APMoV;
- tuber-borne viral infections (most important viruses PLRV, PVS, PVX, PVY and PVM).
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Five curators stated that collection have not been affected at all, whereas in 17 genebanks germplasm has been infected to some extent (Table 9, Annex 4). Tuber infection is mentioned particularly, only five genebanks mentioning problems with seed-borne diseases. The limited reporting of seed-borne diseases is partly the result of quarantine regulations, prohibiting movement of germplasm without a certificate, but also because not all collections screen for such diseases, which may result in under-reporting.

Sixteen genebanks mentioned that they had the capacity or had access to facilities to detect and/or eradicate pathogens of potato germplasm, whereas for six collections available capacity was limited. Ten curators stated that they needed assistance in the form of training and better facilities to improve the health status of their collections.

5.4.8 Safety duplication

In answering the questionnaire, the distinction between conscious safety duplication and general (undesirable) duplication was not clearly made. A number of curators of genebanks in Latin America stated that their germplasm was safety duplicated at CIP, whereas CIP indicated that the same germplasm of these collections was simply duplicated in the CIP collection, meaning that it was also available from the CIP collection to users.
In answering the questionnaire 18 curators indicated that the collection or part of it was safety duplicated elsewhere. Eight collections had been safety duplicated in another country, whereas nine collection holders mentioned that the collection was safety duplicated in the same country, often in the central genebank of that country. Nine curators mentioned that germplasm of other potato collections was safety duplicated at their own facilities (Table 11, Annex 4). It is not clear in sufficient detail how many accessions of potato are currently safety duplicated.

5.4.9 General management of germplasm

Through the questionnaire curators were requested to provide information on written procedures or protocols for the management of genebank activities, as components of a quality management system. This question addressed eight different genebank functions. An overview of germplasm management in the 23 genebanks is presented in Table 13 (Annex 4). The following conclusions can be drawn:

- four genebanks have developed procedures or protocols for seven or eight genebank functions;
- fourteen collection holders have developed procedures or protocols for two to six genebank functions;
- four genebanks did not provide information, pointing to the absence of written procedures or protocols, whereas one mentioned that it planned to do so soon.
- only one genebank has been externally certified according to ISO regulations.

5.5 Collaboration between genebanks

Potato genebanks currently collaborate in three networks. These networks, largely operating on an informal basis, are:

a. the Association of Potato Inter genebank Collaborators (APIC),
b. the Working Group on Potato of the European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR), and
c. collaborative agreements between CIP and other institutions in South America and globally (cryopreservation).

APIC, established in 1990, has as its major objectives:

- the development and operation of a common set of databases, the International Potato Databases (IPD),
- the promotion of exchange of germplasm, technology and data,
- the improvement of conservation efficiency,
- the implementation of joint research, and
- the planning of joint expeditions.

Between 1990 and 2002 APIC organized several meetings, often in connection with other conferences or meetings featuring potato (Bamberg *et al.*, 1995; Huamán *et al.*, 2000a; Huamán, 2000b; Bamberg, presentation Workshop CIP, 2005). APIC has currently eight

genebank members. Participation of its members in meetings has varied, whereas all potato curators have been welcome to participate in APIC meetings. Since 1992 APIC members organized six joint collecting missions to regions of the centre of diversity of potato, including Mexico, Peru, the USA and Central America). APIC has established databases for wild species and for native cultivars of the centre of diversity (Huamán *et al.*, 2000a; Hoekstra, 2002).

The ECP/GR Working Group on Potato was established in 2000 at the closure of the EU-GENRES project on potato (1996-2000). This EU project involved 12 partners of six EU countries. Its major objectives were:

- the establishment of central data bases of potato collections for Europe,
- the improvement of the health status of European collections,
- the characterization and evaluation of potato germplasm, and
- the rationalization of collections.

The ECP/GR Working Group on Potato continued most of the activities initiated by the EU project and counts presently 28 members of most European countries (Hoekstra *et al.*, 2001). Two meetings have been organized, the last one in 2002 in Hamburg. In addition to the further development of the APIC database on wild species by the Centre of Genetic Resources, the Netherlands (Hoekstra, 2002), a European Cultivated Potato Database was established by SASA, UK (Hoekstra and Carnegie, 2001). Details on the two databases can be found on the Internet at www.potgenebank.org (IPD, APIC) and www.europotato.org respectively. More details on the collections included in these databases are presented in the tables of Annex 5.

CIP is involved in three collaborative projects with genebanks and organizations in South America and one global project on cryopreservation (Willy Roca, presentation at Workshop CIP, 2005). These projects are:

- "homologisation" of Andean cultivated native potato collections with the aim to assess potential duplication in the collections from Bolivia, Peru, Ecuador and the collection held at CIP;
- characterisation of wild potato collections with the purpose to characterize the reproductive parameters of wild species, in three locations in Peru; cooperation with three universities in Peru;
- *in situ* conservation of native potato cultivars to promote on-farm conservation in biodiversity hotspots through community-based management linked to *ex situ* activities for restoring crop diversity in the Andes. Cooperation with NGOs, local governments and farmers in Peru (3 partners) and Venezuela (3 partners);
- potato cryopreservation to develop and establish cryocollections of potato germplasm, as part of a network of cryocollections for clonally propagated crops; cooperation with Catholic Univ. of Leuven, Belgium; CIAT, Columbia; IITA, Nigeria; and INIBAP, France).

Bilateral cooperation between potato genebanks also occurs, particularly in the field of collecting missions, safety duplication, training and exchange of materials.

Between 1970 and 1987 CIP organised four Planning Conferences on the conservation of potato genetic resources. Potato curators from all over the world participated in these meetings and discussed research, conservation strategies and exploration activities. Unfortunately, the last meeting was organized as long ago as in 1987. The recent Lima workshop at CIP was a first opportunity for potato curators to discuss conservation strategies at the global level again.

5.6 Utilisation of collections and involvement of institutions not holding collections

The responses to the questions dealing with the evaluation and distribution of germplasm revealed that potato germplasm is extensively requested by different types of users (Table 10, Annex 4). Distribution according to user-type ranged as follows:

- 40-100 % domestic versus 0- 60 % foreign use
- 9-100 % public sector versus 0- 75 % private sector use and 0- 82 % use by NGOs and farmers.

The annual distribution of 19 potato collections, averaged over the period 2002-2004 amounted 16,460 accessions, amounting to a high of 28% of total holdings. However, large differences in distribution between the reporting genebanks exist, ranging from distribution levels of 23 to 7,630 accessions per year. The size of the collection and the country where the collection is situated heavily influence distribution levels. Table 10 (Annex 4) provides more details on the distribution from the various genebanks to users.
Differences in the type of users of the potato material are distinct. Most requests come from users in the same country. The domestic public sector makes most frequently use of the germplasm, but some genebanks provide large number of accessions to the private sector (breeding companies). In South America and Canada farmers and NGOs intensively use the germplasm of the national genebanks. However, some genebanks distribute a substantial number of accessions to users abroad.

The distribution figures also provide an indication of the involvement of non-genebank institutions. NGOs and farmers use native cultivars and old varieties, often for crop production on-farm, and contribute with this activity to the *in situ* conservation (regeneration, evaluation and storage) of germplasm. Most of these activities take place in the Andes (e.g. “Parque de la Papa”, Cusco, Peru; “Papa Andina” project, Cochabamba, Bolivia, CONDESAN, Venezuela). The potato germplasm distributed to the public and private sectors is used in particular for evaluation of major traits and to detect new genes for further breeding (see 4.3.4). Several of these latter stakeholders are also maintaining small working collections of potato germplasm.

It can be concluded that potato germplasm is actively used worldwide and the involvement of institutions for which conservation is not a core business is substantial.

5.7 Constraints, needs and offers for capacity building

5.7.1 Constraints in genebank functions

The questionnaire asked the curators about constraints resulting in a suboptimal maintenance of the collections. Fourteen potato collections stated that they do experience constraints. The most frequently mentioned constraint was a limited regeneration capacity to maintain the collection (all responses). Insufficient facilities for optimal maintenance (storage) and inadequate funds for fulfilling different genebank functions were each mentioned five times. Inadequately trained staff was less frequently mentioned (3X). The seven potato collection holders in South America, including CIP, mentioned most constraints. In this context the following statement was made:

“There is an increasing gap between the experienced (some close to retirement) and young genetic resources specialists in the Andean countries. A program is required to support the development of a new generation of potato curators”

Constraints in Europe are particularly reported from East European countries (Russia, Romania and Slovakia).

5.7.2 Needs and offers for capacity building

The 13 representatives of potato collections participating in the Lima workshop were requested to complete two forms to inventory needs and offers for capacity building. The results of this exercise are presented in Annex 6.

Reported needs regarded eight major functions of potato genetic resources conservation and management. Strengthening the capacity for regeneration, characterization and health screening appeared the most relevant needs. The genebanks of Latin America and Russia (VIR) required assistance in these areas, a finding that agreed with the constraints mentioned in the questionnaire (see 5.6.1).

The curators were also requested to list their potential offers for these same 10 functions. Several genebanks (see Annex 6b) were able to offer assistance for safety duplication, germplasm distribution and training in PGR management. Documentation, regeneration and characterization were offered by five organisations. The important need for health screening was only met by offers from two institutions. In the past, CIP has trained young researchers in this field and it has knowledge and facilities for this activity.

6. Components of the potato conservation strategy

This chapter, although partly based on a set of recommendations adopted at the Lima workshop preparing for the global potato conservation strategy, presents the views of the consultant.

6.1 Status of potato genetic resources collections and current regeneration needs

Potato is the fourth major crop in the world in terms of yield. This warrants substantial efforts for improvement of the crop and for conservation and utilization of potato genetic resources. The worldwide genepool of potato is maintained by approximately 30 major collections only. These collections are situated in the Andean centre of diversity of potato and outside the Latin American region mainly in Europe, North America and a few countries in Asia (India, China and Japan). Annex 4 (Table 2) presents an overview of information on 23 potato collections, for which the questionnaire was completed. In addition, information on the holdings of a few smaller European potato collections, obtained from the ECP/GR databases is included in Annex 5 (Tables 1, 3 and 4).

A short overview of the composition of these 23 collections is presented below. These collections comprise to a very large extent the potato germplasm on which a potato conservation strategy will need to focus.

Wild relatives

More than 17,500 accessions of wild relatives are maintained in 17 collections, but 85% of these accessions are conserved in seven genebanks only, including five genebanks outside the centre of diversity. These latter five genebanks conserve 72% of the total number of wild relatives. CIP maintains an additional number of 2,363 accessions of wild relatives (13%) and has the largest collection within Latin America. Conservation of wild relatives is well organized, although 3,600 accessions of wild species approximately need to be regenerated urgently.

Native cultivars in the centre of diversity

Similar figures apply to native cultivars. Seventeen collections contain more than 17,000 accessions of native cultivars. Approximately 50 % of this material is vegetatively maintained in the centre of diversity in Latin America and 50% in collections situated in Europe, North

America and Asia and maintained either vegetatively or in the form of true seed. Native cultivars include a group of 7 or 8 different species (Table 1, Annex 5). Most of these species are still utilised by local farmers. CIP maintains a large collection of native cultivars of the centre of diversity. In particular, the conservation of native cultivars in the collections of Columbia, Chile, Peru and probably also Bolivia is endangered because of lack of funding and adequate facilities. It is suggested to support these countries in the conservation of native cultivars.

Outside this region, in Europe and North America, germplasm of native cultivars is mainly used as a source for breeding. The genebanks in these regions often maintain native cultivars as populations, which mean that the original genotype is not conserved. Therefore, it is even more important that these native cultivars are conserved in the region of diversity.

Modern potato cultivars and breeding stocks

Twenty-three genebanks maintain over 10,900 accessions of *Solanum tuberosum* spp. *tuberosum* cultivars and more than 13,300 accessions of various breeding stocks (inter-specific hybrids, research materials and breeding lines). Germplasm of this type of materials is generally duplicated between collections. These two types of potato germplasm are important for breeding. Their conservation is currently not endangered. It is suggested to exclude this type of germplasm from support by the Trust**.**

6.2 Accessibility and availability

Passport data of approximately 35,000 accessions are included in the databases of APIC and ECP/GR. (Annex 5, Tables 1,2 and 4). This means that information on 60% of the potato genetic resources approximately is readily accessible. Users do not accurately know which part of the accessions is practically available. At the same time, the responses to the questionnaire indicate that the collections are widely used by different user groups including breeders, researchers, NGOs, and farmers (see 5.4.8). Information on the signing and ratification of the International Treaty of PGRFA of 30 countries involved in the conservation of potato germplasm is presented in Annex 8. Since it may not be automatically assumed that a particular collection is part of the public domain and under the control of a Party that has ratified the Treaty, signing of the Solemn Undertaking (Annex 9) is suggested as a standard procedure in order to ensure accessibility under the conditions of the Multilateral System. Such Solemn Undertaking may also specify which human capacity and facilities the contracting party signing the Solemn Undertaking will make available.

6.3 Securing effective links with users

Globally, various user groups intensively use the available potato germplasm (see 5.4.8). However, more effective use can be expected if the following steps are taken:

- improvement of the existing databases for passport data;
- inclusion of evaluation data on individual accessions in the databases and publication of this information on the Internet, currently achieved by three genebanks only;
- introduction as a standard practice the request to users to return their obtained evaluation data, included in the adopted standard Material Transfer Agreement of the International Treaty; as a result more information can be made available to the user community, potentially enhancing future use.

6.4 Genebank management standards

From the questionnaire and the discussions in the Lima workshop it appeared that management standards considerably differ between different genebanks. In particular, it became clear that for some collections an insufficient number of plants of wild species is used to successfully maintain all genetic diversity during regeneration. Furthermore, storage

facilities and storage methods vary substantially between collections. Finally, the health status of the potato germplasm is not always adequate, and safety duplication is not a common practice yet (see 5.4.6, 5.4.7 and 5.4.9). The questionnaire also revealed that general management practices have seldom been documented in written procedures and protocols as part of some form of a quality management system (see 5.4.10). The participants in the Lima workshop recognized this deficiency and formulated during the workshop a project to establish minimum conservation standards (see 7.2)

6.5 Networks and partnerships

As summarized above, a number of networks and partnerships in potato genetic resources exist, in particular APIC, ECP/GR, and specific project-oriented partnerships involving CIP and other genebanks (see 5.5). Participants in the networks and partnerships meet irregularly. Participants of the Lima workshop stressed the importance of improving the existing networks and increasing the number of partners. In addition to these networks and partnerships, it was suggested to establish a global Consortium to oversee the implementation of the potato conservation strategy, at least consisting of the organisations represented in the Lima workshop. At the the workshop such Consortium was established. It was decided that all curators of the participating genebanks (see list Annex 2b) in the Lima workshop would be members of the Consortium. In addition, representatives of other relevant potato collections, notably those held in Poland, Hungary, Spain, China, India and Japan could join the Consortium Regular meetings, organized once in every 3 to 4 years, similar to the Planning Conferences organised by CIP before 1987. Such consortium would be a useful tool to further develop and implement a rational potato conservation system and could advise if appropriate on the implementation of the activities supported by the Trust.

6.6 Proposed steps towards a rational potato conservation system

During the Lima workshop the discussions focussed on major elements of a rational system. Initially, nine major elements were discussed.

1. Improvement and extension of the documentation in existing international and regional databases as developed by APIC and ECP/GR; data of not yet incorporated collections should be included, and the information of already included potato collections should be updated.
2. Rationalisation of collections, using passport data and other relevant information obtained from phenotypic and molecular characterisation
3. Collaboration in setting standards for conservation, including regeneration, storage (facilities and safety distribution), and health aspects.
4. Need for urgent regeneration of endangered accessions.
5. Health screening in order to improve the health of potato germplasm to allow safe distribution; production and distribution of test kits for virus detection is regarded an important prerequisite in improving germplasm health.
6. Training in genetic resources management, including in health aspects.
7. Filling gaps in the collections, concerning species of the genepool not yet represented at all or under-represented in the collections.
8. Improving the safety duplication of the collections.
9. Repatriation of germplasm and associated information to countries of origin.

In the process, the participants of the workshop determined an order of priority for these nine elements from the perspective of urgency. Five priority elements were identified for further elaboration into proposals for future projects to be submitted for support by the Trust (see Chapter 7).

7. Priorities proposed for support by the Trust

The priorities described below have been selected in the Lima workshop. The consultant responsible for this draft potato genetic resources strategy explicitly agrees with this selection. The motives for this selection have been addressed below.

In establishing priorities for a rational system qualifying for support by the Trust, it was assumed that support may be provided in the form of either support to collaborative projects of several genebanks, contributing to genebank functions of common interest, such as regeneration, rationalisation, database development, safety duplication and improved health status of collections; or, alternatively, support for capacity building and upgrading of individual genebanks to correct apparent constraints regarding facilities, training and temporary actions to improvement of some genebank functions (see Table 2).

7.1 Considerations used in the priority setting process.

Main considerations in the selection of priorities were the needs to:

- to optimise documentation of the collections, in order to improve accessibility, and as a tool for management of the collections from a global perspective;
- to create better storage conditions;
- to improve the level of safety duplication;
- to avoid loss of unique material;
- to rationalise collections by reducing undesirable duplication, in particular of native cultivars;
- to set standards for collection management; and
- to create better conditions for use by clients.

The above considerations were taken into account in discussing proposals for collaborative projects as well as for individual support to genebanks.

7.2 Proposed priority actions and summary of pre-proposals.

Collaborative actions

The potato curators participating in the Lima workshop initially selected five actions from the nine elements recognized as forming part of a rational system (see 6.6). Pre-proposals for consideration by the Trust were formulated in parallel working groups and presented in a plenary session to all curators for discussion and final adoption.

The five pre-proposals proposed for support by the Trust concern:

1. the development of two comprehensive World Potato Genetic Resources Databases for wild species and native cultivars respectively;
2. the establishment of guidelines for effective management of potato genetic resources collections
3. the rationalisation of native cultivars collections;
4. the urgent regeneration of endangered accessions; and
5. the health improvement of potato germplasm maintained in the collections.

The five pre-proposals are presented in detail in Annex 7.

While estimates of the cost of conserving the world's genetic resources for potato vary widely, it is clear that the Trust will only ever be able to make a partial contribution to the total. To extend the Trust's limited resources to cover as many of the most important and needy collections as possible, grant recipients are required to also contribute financial or other resources to the costs of conserving the collections they hold. Such a counterpart contribution also provides a means for recipients to demonstrate their own commitment to long-term conservations – a basic principle of eligibility for support from the Trust. The Trust will expect a fair level for such counterpart contributions – a level that must be sensitive to the financial realities facing the holders of collections.

Taking into account the statement of the Trust cited above, the participants in the Lima workshop further prioritised three out of these initial five proposals for support by the Trust. Clearly, these pre-proposals need further elaboration.

Pre-proposal 1. *Development of two comprehensive World Potato Genetic Resources Databases for wild relatives and native cultivars respectively.*

The establishment of two World Potato Genetic Resources Databases by building on the previously developed APIC and ECP/GR databases is considered an important step in allowing subsequent priority setting towards a rational potato system, and in particular in allowing rationalization of the collections. Documentation of all relevant potato collections should be upgraded to allow for inclusion of information in these two databases to be developed. This proposal was given highest priority, as its product should act as a management tool for the overall improvement of the conservation of potato genetic resources. Any genebank may participate in this project, that may be overseen by the newly established Consortium (see chapter 8), if appropriate.

Pre-proposal 2 *Establishment of conservation guidelines for effective management of potato genetic resources collections.*

Standards for the following elements of *ex situ* conservation of potato genetic resources were discussed:
- regeneration procedures,
- health requirements,
- health testing,
- safety duplication, and
- storage conditions.

It was suggested that guidelines for standards should be further developed by means of an electronic discussion forum.

Pre-proposal 3 *Rationalisation of native cultivars collections*

Before rationalisation can start, information (passport and further characterisation data) of the collections concerned should be analysed to allow for the identification of duplicates. Therefore, implementation of proposal 1 forms a prerequisite for this activity.

Regarding the other two initial priorities it was concluded, that although the health status is important for viability and distribution, meeting health standards should not form a criteria for selection provided cleaning of germplasm concerned is economically feasible. Therefore it was decided to give lower priority to health improvement, although the need to improve the health status of some collections clearly remains (see 5.4.7). Urgent regeneration of endangered accessions is also very important but seemed paramount to first identify duplicates and to set standards for duplication. However, the Trust may consider supporting individual genebanks in this activity (see 7.2)

Capacity building and upgrading of individual genebanks

In addition to the three collaborative actions involving all relevant genebanks, specific needs of individual genebanks were considered. Based on the questionnaire (see 5.7) and the information obtained during the Lima workshop (Annex 6a), seven genebanks were identified which are regarded to have considerable constraints/needs in their conservation activities.

*Table 2. List of major constraints in individual genebanks**

Type of constraints	INTA (ARG)	PROINPA (BLV)	CORPOICA (COL)	UACH (CHI)	INIAP (ECU)	INIA (PER)	VIR (RUS)
Regeneration capacity	X	X		X	X	X	X
Facilities for maintenance	X		X	X		X	X
Staff capacity and training		X	X	X	X	ND	X
Health screening		X	X	X	X	ND	X
Documentation facilities	X			X	X	ND	

With the exception of constraints in documentation facilities, constraints are mentioned by most of these genebanks, and these constraints may be considered for support by the Trust. The focal person visited only the VIR genebank, and the constraints mentioned by the other genebanks have not been locally. Therefore, this recommendation is only based on the information provided by the curators, and it is not clear to which extent support for facilities for maintenance and health screening by these genebanks is really required. Clearly, this also depends on the outcome of work on the level of duplication between genebank collections. As a consequence, it is difficult to prioritise the relative urgency experienced by these genebanks.

With regards to capacity building (training) the curators mentioned the following specific constraints and needs:

- a number of the presently active curators will retire soon and there is a need for training of a new generation,
- there is a need for training in all major genebank functions and in health screening in particular.

Several of the identified constraints of these genebanks are also addressed in the three pre-proposals. Therefore, opportunities may arise to address the individual needs of genebanks in the context of the collaborative projects contained in the three pre-proposals.

As a general note, it should be emphasized that not sufficient time has yet been available to elaborate these carefully selected project ideas into well-underpinned proposals. In particular, the expected results, the time frame, and the budgets needed require further consideration.

7.3 Identification of collections with highest priority for support

A judgement by the consultant on the global status of potato conservation based on the questionnaire and other information obtained in the process leads to the following conclusions.

1. Genebanks in Europe and North America, with the exception of the VIR genebank, function rather well and, relatively speaking, have no major constraints. The mission report on the VIR potato collection revealed that this genebank has problems with optimal regeneration and storage of the cultivars collection.
2. The collections in Japan, India and China do not face many constraints, although the Indian genebank states to have insufficient trained staff for cryopreservation. Curators of these genebanks did not participate in the Lima workshop.
3. CIP has excellent facilities and, thanks to additional funding, it has lately upgraded its facilities and conservation activities substantially, and has in particular increased the regeneration of wild species. The collection of CIP contains a large proportion of the diversity of potato, and the collection is excellently managed.
4. The collections of the other six genebanks in Latin America suffer from a number of constraints and should be given high priority for receiving funding by the Trust. The most important constraints have been summarized above in Table 2.
5. Insufficient information is available on the genebank of Mexico. It should be noted that several wild species with genes for late blight resistance are found in Mexico. A representative of this country, not being the potato curator stated that the situation was very unclear. The questionnaire sent to Mexico has not been returned.
6. In addition to the impact of a possible support by the Trust, other national and institutional factors that determine the probability of sustained proper management of the collections under the given circumstances need to be taken into account. However, it should be recognized that hard data for such considerations are lacking.

In the light of these conclusions, the considerations mentioned under 7.1 and the constraints presented in 7.2 (Table 2), the judgement of the consultant regarding the collections of highest priority for funding under individual agreements are listed in Table 3.

The criteria used to prioritize these collections for support are:

- risks of losing unique potato germplasm;
- lack of adequate facilities for conservation;
- (imminent) lack of sufficiently trained staff;
- lack of proper safety duplication.

Clearly, the institutional support for the listed genebanks needs further investigation, before Trust funding should be allocated.

Table 3. Collections of highest priority for capacity building and upgrading

Collections (Country)	Total number of accessions	Number of native cultivars	Number of wild species
UACH (Chile)	2,097	331	183
INIAP (Ecuador)	511	222	275
INIA (Peru)	630	310	0
PROINPA (Bolivia)	2,207	1,400	500
VIR (Russia)	8,800	3,400	3,100
CORPOCIA (Columbia)	1,159	915	108
INTA (Argentina)	2,011	551	1,460

Genebanks are listed in this table in declining order of urgency of their needs

In offering assistance to the genebanks listed in Table 3, it is suggested that the highest priority should be given to the conservation of clonally propagated native cultivars from the centre of diversity. However, duplication between these collections should be identified first, and adequate database information may assist in this activity. The conservation of accessions of wild relatives in these genebanks should not yet receive high priority, as other genebanks in the world, notably at CIP and in Europe and North America, conserve this type

of germplasm effectively. As can be noticed from Table 2, some of the genebanks listed in Table 3 have indicated that their storage facilities are not up to standards.

Not included are seven collections, which conserve limited, rarely unique germplasm. The scoring is based on the information of the questionnaire and the judgement of the consultant. Annex 9 presents a ranking of the quality of performance of eight genebank functions in 16 relevant potato genebanks. Genebanks are listed in decreasing order of perceived quality of performance of genebank functions. To arrive at such estimate, each genebank function has been given the same weight.

It can be concluded that a group of ten genebanks perform the eight major genebank functions concerned generally well, whereas the lower six collections exhibit constraints in their performance.

7.4 An analysis of the capacity of potato genebanks to meet eligibility principles

A number of countries hosting collections that have been given high priority for support have not yet signed or ratified the International Treaty (Annex 8). In such cases, conditions for access and benefit sharing of PGRFA which conservation is to be supported by the Trust still need to be clarified and agreed. Institutions in countries which do not meet the Trust's eligibility criteria with regard to the International Treaty of PGRFA, may be requested to sign the "Solemn Undertaking for access or conservation" in stead (Annex 10a and b).

8. Process for the implementation of the strategy

In chapter 7, two different options for Trust support, i.e. the funding of collaborative projects involving participation of several genebanks, and capacity building and upgrading of individual genebanks have been proposed.

8.1 Collaborative project implementation

The participants in the Lima workshop agreed to establish a Consortium that can be consulted by the Trust and that, at the request of the Trust, might oversee the implementation of a potato conservation strategy. The activities of the Association of Potato Inter-genebank Collaborators (APIC) conducted from 1990 to 2002 were much appreciated by the participants in the Lima workshop, and it was accepted that the newly established Consortium should take over the role of APIC as a global potato conservation group.
At the request of the Trust, the Consortium could also oversee a process for the further development of pre-proposals based on the priorities outlined above. The three prioritised pre-proposals (see 7.2) need to be further elaborated, and for this purpose an advisory group was appointed consisting of the focal persons of the originaly suggested five projects and additional advisors. The following arrangements were made in the Lima workshop:

I. Focal persons for the five pre-proposals were identified:
   - Documentation (1); Reinhard Simon (CIP) and Roel Hoekstra (CGN)
   - Regeneration (2); Andrea Clausen (INTA)
   - Health screening (3); Enrique Chuioy (CIP)
   - Conservation Standards (4); A. Panta (CIP) and Ximena Cadima (PROINPA)
   - Rationalisation: Carlos Arbizu (CIP)
   -

II. The advisory group was established, and the following members were agreed:
   - Seven focal persons (see II)
   - John Bamberg (USDA-ARS/ NP6)
   - Gavin Ramsey (CPC)

The above researchers agreed to take up their positions in the Consortium's advisory group. It is at the discretion of the Trust how the Trust wishes to make use of this structure in implementing its own potato conservation strategy and to manage project funding.

The *Solanaceae* meeting to be held from 23-28 July 2006 in Madison could be extended with two days for a meeting of the advisory group. The finally selected pre-proposals could be elaborated in more detail at this meeting. Support of the Trust for the participation in the Madison meeting of potato curators, who have no own funding to participate, would be most welcome. In this meeting a coordinator acting as the focal contact person for the Trust could be appointed at the request of the Trust. Considering the funding policy of the Trust (see box 7.2) there will be a need for counterpart contributions to realize the projects described in the pre-proposals. The advisory group could take the lead in getting counterpart contributions. A possibility for financial support may be EU funding (INTAS programme), necessitating the inclusion of European partners (genebanks) in projects to be supported.

8.2 Implementation of capacity building and upgrading of individual collections.

Chapter 7.2 provides information on the needs for capacity building and upgrading of seven genebanks in Latin America and Russia. With regard to training in major genebank functions as listed in Table 2, CIP and several genebanks in Europe and North America are willing to play a role. They have already offered to assist in capacity building (Annex 6b). The widely reported needs for improvement of health screening was only met by offers from two institutions. In the past, CIP has trained young researchers in this field and it has knowledge and facilities for this activity. The Trust may thus consider supporting a course in this field organised by CIP. However, implementation of improved health screening requires facilities in the genebanks concerned. Five out of the seven genebanks indicated that their facilities for health screening and maintenance of the collections are suboptimal. It did not become sufficiently clear which exact requirements these genebanks have. However, the Trust may consider support for these genebanks in improving facilities for the conservation of native cultivars. Further investigation of these needs is suggested.

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

	Country	Contact details of potato collection curators	Question. sent – date	Reply received - date
1.	**Argentina**	Andrea Clausen, INTA, Balcarce, Argentina Curator Potato collection INTA E-mail: aclausen@balcarce.inta.gov.ar Fax: +54 266 2 1756	11/05/2005	02/06/2005
2.	**Bolivia**	Ximena Cadima, PRIONPA, Cocabamba, Bolivia Coordinator PGR (incl. Potato), E-mail: xcadima@prionpa.org Fax: +591 4 4360800	11/05/2005	02/072005
3.	**Bulgaria**	C/o Director Institute for Plant Genetic Resources "K.Malkov" Druzba 2 Sadovo, Plovdiv district, 4122, Bulgaria Email: shamov@yahoo.com	20/05/2005	No replies
4.	**Brazil**	Dr. Fausto Francisco dos Santos Centro Nacional de Pesquisa de Hortalizas (CNPH), EMBRAPA, Brazil Curator Potato Collection Brazil E-mail: fausto@cnph.embrapa.br	11/05/2005	No replies
5.	**Canada**	Ricky Allaby Potato Research Centre, Agriculture and Agri-Food Canada 850 Lincoln Road, P.O. Box 20280 Fredericton, New Brunswick E3B 4Z7, Canada Fax: 506 452 3316 Email: allabyr@agr.gc.ca	20/05/2005	16/06/2005
6.	**Chile**	Andrés Contreras M., Instituto de Producción y Sanidad Vegetal, Universidad Austral de Chile, Casilla 567, Valdivia, Chile. Curator Potato Collection of Chile E-mail: acontrer@uach.cl Fax: +56 63 221733	11/05/2005	01/07/2005
7.	**China**	Dr. Xie Kaiyun Chinese Academy of Agricultural Science (IVF-CAAS) Institute of Crop Germplasm Resources (CAAS) 12 Zhongguancun Nandajie, Beijing, 100081, China Email: xieky@mail.caas.net.cn	20/05/2005	17/06/2005
8.	**Colombia**	Dilmer Moreno Curator Potato Collection of CORPOICA CORPOICA, Tibaitata, AA 151123 , El Dorado , Bogota, Colombia ; e mail : dilmer1923@hotmail.com and Dr. Mario Lobo (pnrgv@epm.net.co)	11/05/2005 and resent on 22/06/2005	17/06/2005
9.	**Czech Republic**	Jaroslava Domkárová Potato Research Institute, 580 01 Havlickuv Brod, Czech Republic E-mail: domkarova@vubhb.cz Fax: + 420 451 21578	11/05/2005	20/06/2005

	Country	Contact details of potato collection curators	Question. sent – date	Reply received - date
10.	**Ecuador**	Ing. Cesar Tapia DENAREF, INIAP, Sta Catania, Quito, Ecuador Curator Potato Collection Ecuador E-mail: denaref@ecnet.ec	11/05/2005	26/07/2005
11.	**France**	Daniel Ellissèche INRA, Amélioration de la Pomme de Terre, 29260 Ploudaniel, France Curator potato collection INRA E-mail: ellissec@rennes.inra.fr Fax: +33 229 626330	11/05/2005	17/06/2005
12.	**Germany**	Dr. Claus Dehmer, Institute of Plant Genetic Resources and Crop Plant Research (IPK), Gross Lusewitz , Germany Potato Curator IPK E-mail: glksmv@t-online.de Fax: +49 38209 82313	11/05/2005	28/06/2005
13.	**Hungary**	Sandor Horvath Regional Potato Research Centre of Veszprem, Hungary Email: hs@georgikon.hu	20/05/2005 and resent on 17/06/2005	No replies
14.	**Japan**	Dr. Kazuyoshi Hosaka Faculty of Agriculture Kobe University Rokkodai-cho, Nada-ku, Kobe-shi 657 Japan Email: hosaka@kobe-u.ac.jp	17/06/2005	Not relevant
15.	**Japan**	Dr. Kazutoshi Okuno, Director of Genebank, National Institute of Agrobiological Sciences, Kannondai 2-1-2, Tsukuba Ibaraki 305-8602, Japan Tel: +81-29-838-7930, Fax: +81-29-838-7408 E-mail: okusan@affrc.go.jp	27/06/2005	27/07/2005
16.	**India**	Dr. G.S. Shekhawat Central Potato Research Institute, Indian Council of Agric. Research Shimla, Himachal Pradesh, 171001, India Email: director@cpri.hp.nic.in Email:shekhawat@excite.com or director@cpri.hp.nic.in	19/05/2005	10/10/2005
17.	**Ireland**	Dennis Griffin Teagasc, Oakpark, Ireland Email: Dgriffin@oakpark.teagasc.ie Fax: 353 599142423	19/05/2005	No replies
18.	**Mexico**	Dr. Alejandro Espinoza INIFAP, Mexico Curator Potato Collection Mexico E-mail: espinoal@inifap2.inifap.conacyt.mx	11/05/2005	No replies
19.	**Mexico**	Dr. Jesus A. Cuevas Sanchez Banco Nacional de Germoplasma Veget, Dep. de Fitotecnia, Univ. Aut. de Chapingo Carretera Mexico-Texcoco km.38.5 Chapingo, Texcoco, EDO de México 56230, Mexico Email: cuevasax@correo.chapingo.mx and jaxayacatl@yahoo.com	17/06/2005	No replies

	Country	Contact details of potato collection curators	Question. sent – date	Reply received - date
20.	**The Netherlands**	Ir. Roel Hoekstra, Centre for Genetic Resources, The Netherlands, Wageningen, The Netherlands Curator of the Potato Collection. Manager APIC database of wild potato species E-mail: roel.hoekstra@wur.nl Fax: +31 317 423110	11/05/2005	20/06/2005
21.	**Peru**	Dr. William Roca, Head Genetic Resources Unit CIP International Potato Centre (CIP), Lima, Peru E-mail: w.roca@cgiar.org Fax: +51 1 317 5326	11/05/2005	28/06/2005
22.	**Peru**	Ing. Valeriano Huanco Sacachipana Estacion Experimental Santa Anna, INIA Real #507, El Tambo, Huancayo, Peru Curator Potato Collection Peru E-mail: staana@inia.gob.pe	11/05/2005	23/08/2005
23.	**Peru**	Dr. Ramiro Ortega, Potato Curator CRIBA, Univ. San Antonio de Abad, Cusco, Peru Email: criba@terra.com.pe	19/05/2005	No replies
24.	**Poland**	Jerzy Lewosz, Plant Breeding and Acclimatisation Institute (IHAR), Potato Branch Division, Bonin, Poland E-mail: iziem@man.koszalin.pl Fax: +48 94 342728	11/05/2005	No replies
25.	**Romania**	Dimitru Bodea Genebank of Suceava/ Agriculktural Research Station of Suceava, B-dul 1 Decembrie, no 15 5800 Suceava, Romania Tel: (402-30) 210573 Fax: (402-30) 222879 Email: genebank@suceava.astral.ro	11/05/2005	16/08/2005
26.	**Russia**	Dr. Stepan Kiru, VIR, Petersburg, Russia Curator Potato Collection of VIR E-mail: s.kiru@vir.nw.ru or step_kiru@imail.ru Fax: +7 812 3118762	11/05/2005	12/06/2005
27.	**Slovakia**	Eva Brutovska Potato Research and Breeding Institute (VSUZ), Popradská 518 Velka Lomnica, 059 52, Slovakia Email: forisek@sinet.sk	13/06/2005	15/06/2005
28.	**Slovenia**	Peter Dolnicar Biotechniska fakulteta, Slovenia Email: peter.dolnicar@kis.si	13/06/2005	19/06/2005
29.	**Spain**	Dr. Domingo Rios, Curator Centro de Conservacion de la Dbiodiversidad Agricola de Tenerife Cabildo Consular de Tenerife Carretera de Tacoronte -Tejina , 20 A 38350 Tacoronte Santa Cruz de Tenerife, Canarias, Spain Tel. 00-34-922 573110 Email : domingor@cabtfe.es or ccbiodiversidad@cabtfe.es	22/06/2005	15/07/2005

	Country	Contact details of potato collection curators	Question. sent – date	Reply received - date
30.	**Sweden**	Director of NGB Nordic Genebank P.O. Box 41, Alnarp, S-23053, Sweden Email: nordgen@ngb.se	20/05/2005	10/07/ 2005
31.	**Ukraine**	Anatoly A. Podgajetskiy Institute for Potato Production Ukrainian Academy of Agric. Sciences Chkalov 22, Nyemeshayevo Borodyanka district, Kiev region, 255740, Ukraine Email: podgaetsky@minapk.kiev.ua or upri@visti.com	20/05/2005	No replies
32.	**United Kingdom**	Dr. John Bradshaw or Gavin Ramsay, Commonwealth Potato Collection, SCRI, Dundee, United Kingdom E-mail: jbrads@scri.sari.ac.uk or gramsa@scri.sari.ac.uk Fax: +44 1382 562 426	11/05/2005	07/072005
33.	**United Kingdom**	Dr. Stuart Carnegie, SASA, East Craigs, Edinburgh, United Kingdom Curator of the UK collection of modern potato varieties Manager of the European database of collections of potato varieties and breeding lines. E-mail: stuart.Carnegie@sasa.gov.uk Fax: +44 131 2448940	11/05/2005	No replies
34.	**USA**	Dr. John Bamburg, USDA, ARS Potato Introduction Project Sturgeon Bay, USA Curator USDA, ARS Potato Collection (NP6) E-mail: Nr6jb@ars-grin.gov Fax: +1 414 743 1080	11/05/2005	June 2005
35.	**Venezuela**	Ms. Lourdes Gonzales Centro de Investigación Agropec. del Estado de Merida, INIA Av. Urdaneta, Edf. MAC Apartado 425 Merida, Estado Merida, 5101, Venezuela Email:lcgonzalez@inia.gov.ve and lourdesgonzales@yahoo.com	17/06/2005	No replies

Annex 2a Program Lima Workshop

Workshop of Potato *Ex situ* Collection Curators to Develop a Global Potato Conservation Strategy
Headquarters of the International Potato Centre (CIP), Lima, Peru
24-25-26 August 2005

Objectives:
- To consult the representatives of relevant potato collections in order to develop a strategy for the efficient and effective conservation of potato genetic resources;
- To access the state of art of potato conservation in the world and to identify collections or networks which may be eligible for long-term support by the Global Crop Diversity Trust
- To discuss conservation standards and criteria for long-term support from the Trust

Programme:

Wednesday August 24, 2005	
Time	**Topics**
9:00 – 10:30	*Plenary session (Chair: Loek van Soest, Rap.: Willy Roca)* o Welcome and opening - CIP DG and *Loek van Soest* o Brief introduction of the participants – *All* o Approval of tentative programme and logistics information o Introduction of the Global Crop Diversity Trust and the conservation strategies – *Brigitte Laliberté* o Introduction to the Global Potato Conservation Strategy – *Loek van Soest* o Discussion
10:30 – 11:00	*Coffee break*
11:00 – 12:30	*Plenary session (Chair: Brigitte Laliberté, Rap.: Loek van Soest)* o Results of the questionnaires – *Loek van Soest* o Discussion on the outcome of the questionnaire o Presentations of the representatives of potato genebanks – *5 minutes each* o Discussion
12:30 – 14:00	*Lunch*
14:00 – 15:30	*Plenary session (Chair: Loek van Soest, Rap.: Brigitte Laliberté)* Potato Networks in the world (*10 minutes each presentation*): o CIP – *Willy Roca, E. Chujoy* o APIC - *John Bamberg* o ECP/GR potato working group – *Roel Hoekstra* o International databases o APIC data base of wild potato species - *Roel Hoekstra* o APIC data base of primitive potato cultivars – CIP- *R.Simon, R.Gomez* o Discussion
15:30 – 16:00	*Coffee break*
16:00 – 17:00	*Plenary session (Chair: Brigitte Laliberté)* o General discussion on the conservation strategy, on expectations from this workshop and on the next 2 days proposed programme
19:00 onwards	Social dinner – meeting at reception at 19:00

Thursday August 25, 2005	
8:30 – 8:45	*Working Groups Session 1: key collections – Introduction: Brigitte*
8:45 – 9:45	*Working Groups Session 1* 1. Factors and indicators of importance 2. Status of potato germplasm collections and key collections to be involved in the global conservation strategy 3. Information for assessing the priority collections and capacity building needs
9:45 – 10:30	*Plenary session (Chair: Willy, Rap.: Brigitte)* o Reports from the working groups Session 1 o General discussion and conclusion/recommendations on the key collections
10:30 – 11:00	*Coffee break*
11:00 – 11:15	*Working Groups Session 2: collaboration – Introduction: Brigitte*
11:15 – 12:30	*Working Groups Session 2* 1. Collaborative arrangements (sharing of responsibilities) for the conservation of potato germplasm (including conservation, regeneration, characterisation /evaluation, documentation, safety-duplication, distribution/access, links with users, shared information systems/databases etc.)
12:30 – 14:00	*Lunch*
14:00 – 14:30	*Working Groups Session 2 – continued* 2. Role and responsibilities of relevant PGR networks and of international and national collections in collaboration/sharing of responsibilities
14:30 – 15:30	*Plenary session (Chair: Brigitte, Rap.: Loek)* o Reports from the working groups Session 2 o General discussion and conclusion/recommendations on the collaboration and sharing of responsibilities
15:30 – 16:00	*Coffee break*
16:00 – 16:15	*Working Groups Session 3: capacity building needs – introduction: Brigitte*
16:10 – 17:00	*Working Groups Session 3* 1. *Ex situ* conservation standards for potato collections and recommendations for eligibility for long-term support from the Trust 2. Identification of capacity building and upgrading needs and priorities
17:00 – 18:00	*Plenary session (Chair: Loek, Rap.: Willy)* o Reports from the working groups Session 3 o General discussion and conclusion/recommendations on standards and priority capacity building and upgrading needs
Evening	*Drafting team for the conservation strategy*

Friday August 26, 2005	
8:00 – 8:30	*Plenary session (Chair: Loek)* o Presentation of an initial draft of the global conservation strategy for potato, the process for endorsement and next steps – *Loek van Soest*
8:30 – 10:30	*Working Groups Session 4* o Discussion on proposed strategy and priority for support from the Trust, and recommendations on completion, the process for endorsement and the next steps
10:30 – 11:00	*Drafting of working group Session 4 reports by chairs and rapporteurs*
11:00 – 11:30	*Coffee break*
11:30 – 12:30	o Visit to the genebank facilities of CIP
12:30 – 14:00	*Lunch*
14:00 – 15:30	*Plenary session (Chair: Brigitte, Rap: Loek)* o Reports from the working groups Session 4 o Establishment of strategy advisory group o Conclusions of the meeting and next steps o Closing of the meeting
15:30 – 16:00	*Closing drinks*

Annex 2b List of Participants in the Workshop of Potato *Ex situ* Collection Curators.

	Name and contact details
1.	Stepan Kiru N. Vavilov Institute of Plant Industrie (VIR) St. Petersburg, Russia Phone: +812-4664641 Fax: +812 4664361 Email: s.kiru@vir.nw.ru or step_kiru@imail.ru
2.	Ximena Cadima PROINPA Cochabamba, Bolivia Phone: +591-4-4360800 Fax: +591-4-4360802 Email: xcadima@proinpa.org
3.	Andrea Clausen INTA Balcarce, Argentina Phone: +54-2266-439100 Fax: +54 2266 439101 E-mail: aclausen@balcarce.inta.gov.ar
4.	Andrés Contreras Universidad Austral de Chile Valdivia, Chile Phone: +56-63-221733 Fax: +56 63 221733 Email: acontrer@uach.cl
5.	Alejandro Espinoza Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias (INIFAP) Texcoco, Mexico Phone: +595-9542877 Fax: +595-9546528 Email: espinosa.alejandro@inifap.gob.mx or espinoale@yahoo.com.mx
6.	José Moreno C.I. Tibaitata, CORPOICA Bogotá, Colombia Phone: +57-1-4227300 Fax: +57-1-4227300 ext. 1435 Email: dilmer1923@hotmail.com or Dr. Mario Lobo: pnrgv@epm.net.co
7.	Alvaro Monteros INIAP - DENAREF Quito, Ecuador Phone: +593-2-2693359 Fax: +593-2-2693359 Email: denaref@ecnet.ec

	Name and contact details
8.	Valeriano Huanco Sacachipana INIEA Huancayo, Peru Phone: +51-1-3495616 Fax: +51-64-246206 E-mail: staana@inia.gob.pe or vhuanco@yahoo.es
9.	John Bamberg US Potato Genebank Sturgeon Bay, USA Phone: +1-920-7435406 Fax: +1-920-7431080 E-mail: nr6jb@ars-grin.gov
10.	Roel Hoekstra Centre for Genetic Resources Wageningen, The Netherlands Phone: +31-317-424502 Fax: +31-317-8094 Email: roel.hoekstra@wur.nl
11.	Gavin Ramsay Scoltish Crop Research Institute Dundee, United Kingdom Phone: +44-1382-562731 Fax: +44-1382-565758 Email: gramsa@scri.sari.ac.uk or gavin.ramsay@scri.ac.uk
12.	Klaus Dehmer Institute of Plant Genetic and Crop Plant Research (IPK) Gross Luesewitz, Germany Phone: +49-38209-80525 Fax: +49-38209-82313 Email: glksmv@t-online.de
13.	Louis van Soest Centre for Genetic Resources Wageningen, The Netherlands Phone: +31-318-413367 Fax: +31-317-418094 Email: loek.vansoest@wur.nl or loek.van.soest@hccnet.nl
14.	Brigitte Laliberté Global Crop Diversity Trust c/o IPGRI Rome, Italy Phone:+39-06-6118272 Fax:+39-06-61979661 Email:b.laliberte@cgiar.org

CIP Participants

	Name and contact details
15.	William Roca International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: w.roca@cgiar.org
16.	Enrique Chujoy International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: e.chujoy@cgiar.org
17.	Alberto Salas International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: a.salas@cgiar.org
18.	Carlos Arbizu International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: c.arbizu@cgiar.org
19.	Daniel Reynoso International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: d.reynoso@cgiar.org

	Name and contact details
20.	Ana Panta International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: a.panta@cgiar.org
21.	Rosario Herrera International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: r.herrera@cgiar.org
22.	Reinhard Simon International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: r.simon@cgiar.org
23.	Matilde Orrillo International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: m.orrillo@cgiar.org
24.	Rene Gomez International Potato Center (CIP) Lima, Perú Phone: +51-1-3496017 Fax: +51-1-3175326 E-mail: r.gomez@cgiar.org

Annex 3 Questionnaire on potato collections

Lead Institute: Centre for Genetic Resources, The Netherlands (Dr. L. Visser)
Facilitator /contact scientist: Ir. Loek J. M. van Soest

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. The Trust has thus commissioned the Centre for Genetic Resources, The Netherlands (CGN) to coordinate the development of a global potato conservation strategy. This questionnaire has been developed in order to seek the advice and input of representatives of the world's major potato collections in the development of the conservation strategy. In particular the questionnaire seeks to assess the status of potato conservation throughout the world and to identify major needs. It is intended that the Global Crop Diversity Trust will base its support for the conservation of potato genetic resources on this strategy, once developed and adopted.

As a key curator of potato collection, we kindly request you to complete the questionnaire. The Centre for Genetic Resources is keen to ensure your active participation in the development of the global potato conservation strategy and will be pleased to keep your informed on its progress and consult you during the development until completion.

1. General information:

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

Is the organisation holding the potato collection:
☐ A - an independent organisation
☐ B - part of a larger organisation

In the case of (B) please provide the name and address of the larger organisation:
_____
_____

Is the organisation holding the collection part of a governmental organisation?
☐ yes ☐ no

If no, what type of organisation is it?
_____
_____

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

Is the institution in charge of the potato 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 potato collection?
……. fte (full time equivalent in per year, 1 fte means that a person is working for 100% on the potato collection)

2. Details on the potato collection

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

Present size of the potato collection:

Type of potato germplasm	**Number of species**	**Total number of accessions**	**% available for distribution**
Wild species			
Primitive forms			
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 potato collection

3.1 Acquisition
Was the collection increased during the last 10 years with new potato germplasm?
☐ 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 organisations
☐ Other sources please specify: _____

Are there important gaps in the potato 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 potato-collecting missions in the next 10 years?
☐ yes ☐ no

3.2 Regeneration
Method of regeneration: Please indicate how the potato germplasm is regenerated.

Type of germplasm	**As population (botanical seed)**	**Vegetative by means of tubers**	In vitro
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 tubers (tu) are planted for the next vegetative regeneration?
☐ < 15 tu ☐ 15 –30 tu ☐31 to 45 tu ☐> 45 tu
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 (botanical seed)**	**Vegetative by means of tubers**	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 potato 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 potato germplasm?
☐ yes ☐some ☐ no
Please indicate which type of material of the potato collection is characterised.

Type of germplasm	**Descriptor list available and used**	*% of the collection* **characterised**
Wild species	Yes / no	
Primitive forms	Yes / no	
Modern varieties	Yes / no	

Which type of descriptor list is used for characterisation?
☐ Standard list of IPGRI
☐ Standard list of UPOV
☐ Independently developed list
☐ List developed by another organisation, please precise: ……

3.4 Documentation and access to information of the collection
Do you use a database information system for the management of the potato collection? ☐ yes ☐ partly ☐ no
If yes, what software is used for the documentation?
_____
_____
Which kind of data of the potato collection has been computerised? Please circle the appropriate answer.

Type of germplasm	**Passport data**	**Characterisation/ evaluation data**	**Management data***
Wild species	Yes / partly / no	Yes / partly / no	Yes / partly / no
Primitive forms	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 potato collection is not computerised, are there plans to do so in the future?
☐ No plans
☐ Computerisation planned within 3 years

Is information of the potato collection accessible through the Internet?
☐ yes ☐ partly ☐ no
Are data of the potato 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 tubers**	In vitro	Cryo conservation
Wild species	Yes / no	Yes / no	Yes / no	Yes / no
Primitive forms	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 potato genebank?

	Type of facility	**Temperature (ºC)**	**RH %**	**Packing material**
Botanical seed				
Storage of tubers				

Do you apply tests to control the quality of stored germplasm?
☐ yes ☐ partly ☐ no
If yes, which tests are conducted?
☐ Germination test of botanical seed
☐ Control of the vitality and health of seed potatoes
☐ Control of true-to-type ness of *in vitro* plantlets

3.6 Health of germplasm
Is the potato 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 botanical seed of wild species
☐ Infection in maintained tubers

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 potato collection?
☐ yes ☐ limited ☐ no
If yes, what type of assistance will be required?
1) _____
2) _____
3) _____

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:
☐ Domestic users:_____% ☐ Foreign users: _____%
☐ Public sector: _____% ☐ Private sector: _____%
☐ NGOs, farmers' organisations: _____%
If yes, do you set specific conditions for distribution? Please specify:
1) _____
2) _____
3) _____

Is the germplasm sufficiently available for distribution?
Botanical seed: ☐ yes ☐ partly ☐ not
Seed potatoes: ☐ yes ☐ partly ☐ not
In vitro germplasm: ☐ yes ☐ partly ☐ not

How many accessions (samples) of the potato collection were distributed over the last 3 years:
2002: _____accessions
2003: _____accessions
2004: _____accessions

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 potato 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
_____
_____

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

If yes, can you specify the name of the holder of the potato 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
- ☐ Characterisation
- ☐ 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 potato collection germplasm

For what purposes is the potato collection used?

- ☐ Research activities (taxonomical studies, diversity studies, evolution studies, etc.)
- ☐ Characterisation of the collection
- ☐ Evaluation for important agronomical traits
- ☐ Plant breeding
- ☐ Biotechnology, e.g. gene isolation, molecular studies, functional genomics, etc

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 potato collection is evaluated for?
1) _____
2) _____
3) _____
4) _____
5) _____

5. Networks of potato genetic resources

Do you collaborate in (a) network(s) as potato collection holder?
☐ yes ☐ no

If, yes please list the name(s), indicate whether it is a national, regional or worldwide network.
1) _____
2) _____
3) _____

What are the major objectives of the network(s) in which you participate?

☐ Joint conservation of potato germplasm
☐ Evaluation or characterisation of potato germplasm
☐ Establishment of central potato database
☐ Rationalisation of the collections
☐ Safety duplication of potato germplasm
Remark: more than one option is possible

Do you consider a worldwide network for potato genetic resources important and would you consider participating in such network? ☐ yes ☐ no

What will be your major interest for participation in a potato PGR network?
1) _____
2) _____
3) _____

6. Policies with regard to access of the potato collection
What is your policy regarding distribution of potato germplasm?
☐ Distribution to any *bona fide* users, without further conditions
☐ Distribution to any *bona fide* users after signing of a MTA
☐ 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 potato 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 potato collection

Will the potato 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 rationalisation
☐ The collection will be reduced as a result of lack of funding or facilities

Are there any constraints for a suboptimal maintenance of the potato 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 potato 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

Have you got any further remarks or suggestions?
_____
_____
_____
_____
_____

Please return the completed questionnaire, no later than June 17,2005 to:

Ir. Loek J. M. van Soest
Centre for Genetic Resources, the Netherlands
Wageningen University and Research Centre
P.O. Box 16, 6700 AA Wageningen, The Netherlands
Fax: +31 317 423110
Email: loek.vansoest@wur.nl

Annex 4 Tables with results of the questionnaire

Table 1 General information

Collection/ Country	Type of organisation	Financing body	Year of establish-ment	Legal Owner collection	Fte's for manage-ment col.
Latin America					
CIP, PER	CGIAR Centre	International funds	1973	Status FAO	30.5
INTA, ARG	Independent Res. Org.	Government	1973	Research Org.	2.5
Corpoica, COL	Independent Res. Org.	Government	1958/60	Research Org.	2.0
PROINPA, BLV	Private non-profit found.	Government	1965	Government	0.7
UACH, CHI	Independent Res. Org.	Priv. proj. funds	1954	Research Org.	limited
INIAP, ECU	Independent Res. Org.	COSUDE (P)	no info	Research Org.	0.3
INIA, PER	Governmental Org.	Government (P)	1990	Research Org.	3.0
Europe					
VIR, RUS	Governmental Org.	Government	1926	Research Org.	16.0
IPK, DEU	Foundation under publ. law	Government	1992/1947	Not identified	4.5
CGN, NLD	Foundation under publ. law	Government	1974	Government	0.9
INRA, FRA	Independent Res. Org.	Government (P)	1949	Research Org.	4.0
Suceava, ROM	Governmental Org.	Government	1991	Research Org.	2.0
VSUZ, SVK	Private Org.	Government (P)	1987	Government	1.0
KIS, SVN	Governmental Org.	Government	1986	Research Org.	0.3
CPC, GBR	Independent Res. Org.	Government	1938	Not identified	1.0
PRI, CZE	Limited Company	Government	1952	Not identified?	4.8
NGB, SWE	Nordic Council	Nordic Governm	1979	Nordic countr.	0.25
CABTFE, SPA	Governmental Org.	Government	1999	Research Org.	6.0?
North America					
ARS, USA	Governmental Org.	Government	1957	Research Org.	6.0
PGRC3, CAN	Governmental Org.	Government	1992	Research Org.	0.7
Asia					
CAAS, CHN	Governmental Org.	Government (P)	1985	Research Org.	no info
CPRI, IND	Independent Res. Org.	Government	1949	Research Org.	0.8
NIAS, JPN	Independent Res. Org.	Government	1985	Research Org.	no info

(P) = Partly

Table 2 Composition and size of the potato collections

Collection/ Country	**Wild species**		**Native cultivars**		**Cultivars**	**Other**	**Total**
	No. species	Total	No. species	Total	(old/new)	**materials***	**accessions**
Latin America							
CIP, PER	151	2,363	8	4,461	314	3,170	10,308
INTA, ARG	30	1,460	2	551	0	0	2,011
CORPOICA, COL	17	108	5	915	36	100	1,159
PROINPA, BLV	35	500	7	1,400	7	300	2,207
UACH, CHI	6	183	2	331	83	1,500	2,097
INIAP, ECU	43	275	4	222	14	0	511
INIA, PER	0	0	?	310	20	300	630
Subtotal		*4,889*		*8,190*	*474*	*5,3 70*	*18,923*
Europe							
VIR, RUS	172 (192)	3,100	12?	3,400	2,100	200	8,800
IPK, DEU	132	1,349	7	1,711	1,989	845	5,894
CGN, NLD	125	1,961	4	740	0	15	2,716
INRA, FRA	25	600	3	250	1,000	4,600	6,450
Suceava, ROM	0	0	0	0	150	0	150
VSUZ, SVK	12	12			475	525	1,012
KIS, SVN	0	0	0	0	61	30	91
CPC, GBR	83	912	4	692	0	0	1,604
PRI, CZE	28	293	1	3	1,111	638	2,045
NGB, SWE	0	0	0	0	57	7	64
CABTFE, SPA	0	0	3	116	0	0	116
Subtotal		*8,227*		*6,912*	*6,943*	*6,860*	*28,942*
North America							
USDA/ARS, USA	130	3,791	4	1,022	312	534	5,659
PGRC3, CAN	0	0	0	0	52	67	119
Subtotal		*3,791*		*1,022*	*364*	*601*	*5,778*
Asia							
CAAS, CHN	10	150	0	0	300	400	850
CPRI, IND	134	395	2?	924	1,240	69	2,628
NIAS, JPN	35	127	1	25	1,660	31	1,843
Subtotal		*672*		*949*	*3,200*	*500*	*5,321*
Total		**17,579**		**17,073**	**10,981**	**13,331**	**58,964**

* breeding lines, hybrids, etc.

Table 3 Acquisition in past and future

Collection, Country	Acquisition over last 10 years (No. of accessions)			Gaps in collection	Collecting missions planned	Expansion collection, next 5 years
	Wild species	Native cultivars	Others			
Latin America						
CIP, PER	200	0	3,000	Yes, 37 wild spp.	Yes	5-10 %
INTA, ARG	100	198	0	Yes, specific areas	Yes	5-10 %
CORPOICA, COL	0	15	37	Yes	Yes	5-10 %
PROINPA, BLV	500	400	257	Yes	Yes	Same size
UACH, CHI	45	112	1,543	Yes	Yes	5-10 %
INIAP, ECU	0	0	300	Yes, lost local forms	Yes	> 20 %
INIA, PER	0	180	200	Yes	Yes	> 20 %
Subtotal	*845 (4)*	*725 (5)*	*4,867 (6)*			
Europe						
VIR, RUS	488	59	359	Yes	Yes	Same size
IPK, DEU	228	23	482	Yes (Peru))	Yes	Same size
CGN, NLD	106	8	N/A0	Yes, rare spp.	Yes	Same size
INRA, FRA	100	0	600	Yes, wild spp.	No	5-10 %
Suceava, ROM	0	0	120	Yes, wild spp. & lines	Yes	5-10 %
VSUZ, SVK	12	0	665	No	No	5-10 %
KIS, SVN	0	0	35	Yes	No	5-10 %
CPC, GBR	200	0	0	Yes	Yes	5-10 %
PRI, CZE	74	3	581	?	No	5-10 %
NGB, SWE	0	0	Few	Yes	No	Same size
CABTFE, SPA	0	116	0	Yes	Yes	> 20 %
Subtotal	*1,208 (7)*	*209 (5)*	*2,845 (8)*			
North America						
USDA/ARS, USA	600	50	350	Yes	Yes	5-10 %
PGRC3, CAN	Yes, no info	Yes, no info	Yes, no info	Yes	No	> 20%
Subtotal	*600 (1)*	*50 (1)*	*350 (1)*			
Asia						
CAAS, CHN	0	0	500	Yes, prim. Res PGR	Yes	> 20%
CPRI, IND	300	20	455	Yes	Yes	5-10 %
NIAS, JPN	127	11	908	Yes, breeding lines	Yes	Same size
Subtotal	*427(2)*	*31 (2)*	*1,863 (3)*			
Total (no of banks)	**3,080 (14)**	**1,195 (13)**	**10,125 (18)**			

Table 4 Regeneration of potato collections

4.1 Regeneration of wild species, as population and in the form of botanical seeds

Collection/ Country	Wild species (Number of plants regenerated)	Annual capacity	% urgently to be regenerated	No. of accessions to be urgently regenerated
Latin America				
CIP, Peru	21-30 pl	200	10	235
INTA, ARG	> 30 pl	70	15	22
CORPOICA, COL	Veg. & in vitro	68?	100	68
PROINPA, BLV	Veg. & in vitro	30	100	500
UACH, CHI	10-20 pl	27	80	146
INIAP, ECU	No info	0	100	275
INIA, PER	N/A	N/A	N/A	N/A
Subtotal		*327*		*1,032*
Europe				
VIR, RUS	< 10 pl	250-300	35	1,085
IPK, DEU	10-20 pl	200	No needs	0
CGN, NLD	21-30 pl	53	40	785
INRA, FRA	Veg. & in vitro	600?	?	
Suceava, ROM	No wild species	N/A	N/A	N/A
VSUZ, Slovakia	Veg. & in vitro	12	0	0
KIS, Slovenia	No wild species	N/A	N/A	N/A
CPC, UK	10-20 pl	c. 60?	40	365
PRI, CZE	In vitro < 10 pl	293?	0	0
NGB, SWE	No wild species	N/A	N/A	N/A
CABTFE, SPA	No wild species	N/A	N/A	N/A
Subtotal		*1,468*		*2,235*
North America				
USDA/ARS, USA	21-30 pl	300	5	190
PGRC3, CAN	No wild species	N/A	N/A	N/A
Subtotal		*300*		*190*
Asia				
CAAS, CHN	> 30 pl	No info	0	0
CPRI, IND	10-20 pl	50?	50	147
NIAS, JPN	10-20 pl	130?	6	12
Subtotal		*180*		*12*
Total		**2,275**		**3,616**

4.2 Regeneration of native cultivars from the Centre of Diversity.
Vegetative propagation in form of tubers (tu) and/or plantlets in vitro, and true seed production, generative regeneration on plants (pl).

Collection/ Country	Mode of regeneration or conservation	Native cultivars (No of tubers, plants or plantlets used to regenerate)	Annual capacity	% urgently to be regenerated
Latin America				
CIP, PER	Tubers/ *in vitro*	15-30 tu/ 10 plantlets	2000	30
INTA, ARG	*In vitro*	10 plantlets	300	0
CORPOICA, COL	Tubers/ *in vitro*	15-30 tu/ 10 plantlets	801/659	30
PROINPA, BLV	Tubers/ *in vitro*	< 15 tu /11-30 plantlets	1400	100
UACH, CHI	Population/vegetative	10-20 pl/15-30 tubers	330	65
INIAP, ECU	Tubers/ *in vitro*	15-30 tubers	120/250	50
INIA, PER	Tubers/ *in vitro*	15 tu/10 plantlets	620/23	32
Europe				
VIR, RUS	Population/*in vitro*	10-20 pl/ < 10 plantlets	100-130	30
IPK, DEU	Population	10-20 pl	No info	No needs
CGN, NLD	Population	21-30 pl	7	76
INRA, FRA	Tubers/ *in vitro*	< 10 pl	250	No needs
Suceava, ROM	Tubers/ *in vitro*	15-30 tu/ 11-30 plantlets	120/90	Low
VSUZ, SVK	N/A, only modern var.	N/A	N/A	N/A
KIS, SVN	N/A, only modern var.	N/A	N/A	N/A
CPC, GBR	Population	10-20 pl	40	70
PRI, CZE	*In vitro*	< 10 pl	3	3
NGB, SWE	No primitive forms	N/A	N/A	N/A
CABTFE, SPA	Tubers & part *in vitro*	15-30 tubers	116	All for true seed
North America				
USDA/ARS, USA	Tubers/ *in vitro*	15-30 tubers	25	0
PGRC3, CAN	N/A, only modern var.	N/A	N/A	N/A
Asia				
CAAS, CHN	Tubers/ *in vitro*	> 45 tu/ > 30 plantlets	No info	0
CPRI, IND	Tubers/ *in vitro*	15-30 tu/ 11-30 plantlets	90	100
NIAS, JPN	Tubers/ *in vitro*	15-30 tu/ 11-30 plantlets	30	28

Table 5 Identification and characterisation of collections

Collection/ Country	Classification of accessions	Assistance taxonomist	Descriptor list (type)	% collection characterised
Latin America				
CIP, PER	Yes	Yes	Yes/ CIP's own list	100% cultivated species
INTA, ARG	Yes	Yes	Yes, IPGRI & own list	60% wild, 100% prim.
CORPOICA, COL	Not all	No	Yes, list of CIP	15% wild, 100%cult.
PROINPA, BLV	Yes	Some	Yes, IPGRI	Cultivated partly
UACH, CHI	Not all	Some	Yes, IPGRI	98%wild, 97% prim.
INIAP, ECU	Not all (50%)	No	Yes, IPGRI	98 % cultivated species
INIA, PER	Not all	Some	CIP's list	15% prim, 80% cult.
Europe				
VIR, RUS	Yes	Yes	Yes, IPGRI & own list	63%wild, 85% cult.
IPK, DEU	Nearly all	Some	Yes/ IPGRI, UPOV, own	5 - 95 %
CGN, NLD	Nearly all	Some	No, only wild relatives	not applicable
INRA, FRA	Not all	No	Yes, UPOV(cultivars)	100 % of cultivars
Suceava, ROM	Yes	No	Yes, IPGRI & own list	50 % native cultivars?
VSUZ, SVK	Yes	No	Yes, UPOV (cultivars)	50 % of cultivars
KIS, SVN	Yes	No	Yes, UPOV (cultivars)	50 % of cultivars
CPC, GBR	Nearly all	Curator skilled	No	0 %
PRI, CZE	Yes	No	Yes, own list (cultivars)	85 % of cultivars
NGB, SWE	Yes	No	Yes, UPOV (cultivars)	100 % of cultivars
CABTFE, SPA	Not all	Yes	Yes, IPGRI and CIP lists	50% native cultivars
North America				
USDA/ARS, USA	Yes	Yes	Yes, own lists	100 %, all material
PGRC3, CAN	Yes	Some	Yes, own list (cultivars	100 % of cultivars
Asia				
CAAS, CHN	10% not	Some	Yes, only cultivars	80 % of cultivars
CPRI, IND	Yes	No	Yes, own list	100 % of cultivars
NIAS, JPN	Yes	Some	Yes, own list	100 %, all material

Table 6. Evaluation and the collections

Collection/ Country	**Evaluation** (*Ad hoc* or Systematic)	**Type of evaluations** (Biotic & A-biotic stresses and Quality)
Latin America		
CIP, PER	Systematic	Bio, A-bio, Qua
INTA, ARG	Ad hoc	Agronomical traits
CORPOICA, COL	Considered	No info
PROINPA, BLV	Systematic	Bio, Agro-Industrial
UACH, CHI	No info	No info
INIAP, ECU	Systematic	Bio, Qua & yield
INIA, PER	Systematic	Agronomical traits
Europe		
VIR, RUS	Systematic	Bio, A-bio, Qua & yield
IPK, DEU	Systematic	Bio
CGN, NLD	Ad hoc	Bio, Qua
INRA, FRA	Systematic	Bio
Suceava, ROM	Systematic	Bio
VSUZ, SVK	*Ad hoc*	Bio, Qua & Agronomical traits
KIS, SVN	No	N/A
CPC, GBR	Systematic	Bio, Other (molecular)
PRI, CZE	Systematic	Bio, Qua & Agronomical traits
NGB, SWE	*Ad hoc*	Bio, Qua & Agronomical traits
CABTFE, SPA	No	N/A
North America		
USDA/ARS, USA	*Ad hoc*	Bio, Qua, Agronopmical traits, Other (molecular)
PGRC3, CAN	Systematic	Qua, antioxidant levels
Asia		
CAAS, CHN	Systematic	Bio, A-bio,& Qua
CPRI, IND	Systematic	Bio, A-bio
NIAS, JPN	Systematic	Bio, A-bio, Qua & yield

Table 7 Documentation and access to information of the collection

Collection/ Country	**Collection computerised**	***Data computerised***		
		Passport	***Characterisation evaluation***	***Management***
Latin America				
CIP, PER	Yes	Yes	Yes/partly	Yes
INTA, ARG	Yes	Yes	Partly cultivars	Partly
CORPOICA, COL	No	No	No	No
PROINPA, BLV	Partly	Partly	Partly	Partly
UACH, CHI	Partly	No info	No info	No info
INIAP, ECU	Partly	Partly	Partly	Partly
EMBRAPA, BRA				
Europe				
VIR, RUS	Yes/partly	Yes	Partly	Partly
IPK, DEU	Yes	Yes	Yes, partly	Yes, partly
CGN, NLD	Yes	Yes	Yes	Yes
INRA, FRA	Partly	Partly	Partly	Partly
Suceava, ROM	Yes, landraces	Yes	Partly	Partly
VSUZ, SVK	Partly	Partly	Partly	No
KIS, SVN	Partly, cultivars	No	Partly	Yes
CPC, GBR	Yes	Yes	Yes	Yes
PRI, CZE	Yes	Yes	Partly cultivars	No
NGB, SWE	Yes	Yes	Yes	Partly
Malkov, BUL				
CABTFE, SPA	Yes, landraces	Yes	Partly	Partly
North America				
USDA/ARS, USA	Yes	Yes	Yes	Yes
PGRC3, CAN	Yes	Partly	Partly	Yes
Asia				
CAAS, CHN	Yes	Partly	Partly	Partly
CPRI, IND	Yes	Partly	Partly	Partly
NIAS, JPN	Yes	Yes	Yes	Yes

Table 8 Storage methods and conditions

Collection/ Country	Storage true seeds	Storage conditions Medium/long term	Storage tubers conditions	In vitro storage
Latin America				
CIP, PER	Medium/long	0 & -20ºC, 75 % RH	4 ºC, 75 % RH	Yes, all germplasm
INTA, ARG	Medium	4-5 ºC, no RH control	7-8 ºC, no RH control	Yes, cultivated
CORPOICA, COL	Medium/long	0 &-20 ºC, 48 % RH	8 ºC, 70 % RH	No info
PROINPA, BLV	Medium	4 ºC, no RH control	6-8 ºC, no RH control	Yes, cultivated
UACH, CHI	Long, freezer	-18 ºC, no RH control	6-12 ºC, 95 % RH	No info
INIAP, ECU	Long	-15 ºC, 75 % RH	14 ºC, 60 % RH	Yes, landraces
INIA, PER	N/A	N/A	13 ºC, 30 % RH	No info
Europe				
VIR, RUS	Medium/long	4&-10º C,no RH contr	4 ºC, 70 % RH	Yes, partly wild
IPK, DEU	Medium	4 ºC, 5-7 % RH	4 – 10 ºC, 70 % RH	Yes, all germplasm
CGN, NLD	Medium/long	4&-20º C,no RH contr	4 ºC, 70 % RH	N/A
INRA, FRA	No storage	N/A	2-4 ºC, 75 % RH	Yes, all germplasm
Suceava, ROM	No storage	N/A	4-12 ºC, no RH contr.	Yes, landraces
VSUZ, SVK	No storage	N/A	4 ºC, 85 % RH	Yes, all germplasm
KIS, SVN	No storage	N/A	2-7ºC, 80 % RH	Yes, cultivated
CPC, GBR	Long	-20 ºC, 6 % RH	4 ºC, no info RH	N/A
PRI, CZE	Yes, no info	No info	Yes, no info	Yes, no info
NGB, SWE	Long	-20 ºC, no RH control	4 ºC, no info RH	Yes, cultivated
CABTFE, SPA	Medium/long	4 & -20 ºC, 40 % RH	4 ºC, 90 % RH	Yes, landraces
North America				
USDA/ARS, USA	Medium/long	-7 ºC /-18 ºC, no RH	6 ºC, 75 % RH	Yes, in vitro 10 ºC
PGRC3, CAN	No storage	N/A	4 ºC, 75 % RH	Yes, cultivated
Asia				
CAAS, CHN	No storage	N/A	4 ºC, 80-90 % RH	Yes, all germplasm
CPRI, IND	Medium/long	N/A	5- 12 ºC, no RH	Partly wild species
NIAS, JPN	No storage	N/A	4 ºC, 90 % RH (all)	Yes, cultivars, lines

Table 9 Health of potato collection

Collection/ Country	Germplasm affected	Type of disease infection*	Capable to eradicate diseases	Assistance required to improve health status
Latin America				
CIP, PER	Yes	Seed-b	Yes	Yes,funds, eff. methods
INTA, ARG	Slightly	Seed-b & inf. tub	Yes	Yes, methods & funds
CORPOICA, COL	Yes	Inf. tub	Yes	Yes, training & funds
PROINPA, BLV	Yes	Inf. tub	Limited	Yes, econ. assistances
UACH, CHI	Yes	Inf. tub	Yes	Yes, funds
INIAP, ECU	Yes	Inf. tub	Limited	Yes, training & funds
INIA, PER	Slightly	Inf. tub	Limited	Yes, training & funds
Europe				
VIR, RUS	Yes	Inf. tub	Limited	Yes, training & funds
IPK, DEU	Slightly	Inf. tub	Yes, outsourced	No
CGN, NLD	Slightly	Seed-b	Limited, outsourced	No, cost restriction
INRA, FRA	No	N/A	Yes	No
Suceava, ROM	Yes	Inf. tub	Limited	Yes, training & funds
VSUZ, SVK	Slightly	Inf. tub	Yes	No
KIS, SVN	Slightly	Inf. tub	Yes	No
CPC, UK	No	N/A	Yes, outsourced	Limited, cost restriction
PRI, CZE	Slightly	No info	Yes	No
NGB, SWE	No	N/A	Yes, outsourced	No
CABTFE, SPA	Slightly	Inf. tub	Yes	Yes, no info
North America				
USDA/ARS, USA	Slightly	Seed-b	Limited	No, cost restriction
PGRC3, CAN	No	N/A	Yes	No
Asia				
CAAS, CHN	No	N/A	Yes	Limited
CPRI, IND	Yes	Inf. tub	Yes	No
NIAS, JPN	Slightly	Inf. tub	Yes	No

* Seed b= seed-borne diseases, inf. tub= infection of maintained tubers (viruses)

Table 10 Distribution of potato collections to users (% of total distribution)

Collection/ Country	Average annual distribution 2002-04	Domestic	Foreign		Public sector	Private sector	NGO's, farmers, etc
Latin America							
CIP, PER	3,000	67	33		9	9	82
INTA, ARG	61	95	5		95	0	5
CORPOICA, COL	750	No info					
PROINPA, BLV	No data	100	0		30	0	70
UACH, CHI	No data	40	60		90		10
INIAP, ECU	30	100	0		50	3	47
INIA, PER	130	100	0		80	0	20
Subtotal	*3,971*						
Europe							
VIR, RUS	425	83	7		83	3	14
IPK, DEU	1,535	88	12		18	73	9
CGN, NLD	705	58	42		89	10	1
INRA, FRA	300	80	20		20	75	5
Suceava, ROM	28	100	0		100	0	0
VSUZ, SVK	45	100	0		100	0	0
KIS, SVN	No data	No info					
CPC, GBR	435	90	10		94	5	1
PRI, CZE	260	95	5		70	30	
NGB, SWE	No data	No info					
CABTFE, SPA	23	100	0		100	0	0
Subtotal	*3,756*						
North America							
USDA/ARS, USA	7,630	85	15		80	20	0
PGRC3, CAN	315	90	10		40	10	50
Subtotal	*7,945*						
Asia							
CAAS, CHN	42	98	2		92	8	0
CPRI, IND	732	100	0		36	35	29
NIAS, JPN	14	100	0		80	20	0
Subtotal	*56*						
Total*/ *Range*	**16,460***	***40-100%***	***0-60%***		***9-100%***	***0-75%***	***0-82%***

* Number of accessions distributed annually by all listed genebank (average over the years 2002, 2003 and 2004)

Table 11 Safety duplication of potato collections

Collection/ Country	Organised	Place of duplication	Holding safety duplicates of other potato collections
Latin America			
CIP, PER	Yes	INTA central genebank, ARG	No? (see COL/CHI)
INTA, ARG	Yes, partly	INTA central genebank, ARG	Yes, local ARG germplasm
CORPOICA, COL	Not really; duplication*	Duplicates in CIP (PER) collections	No
PROINPA, BLV	Yes, partly, wild species	CGN (repatriation)	No
UACH, CHI	Not really, duplication*	Duplicates in CIP (PER) collections	No?
INIAP, ECU	Yes, USDA duplication?	USDA, USA	Yes, 99 acc.?
INIA, PER	Yes, partly	Storehouse farmers	No
Europe			
VIR, RUS	Yes, partly	Partly, Kubean Res. Station	Yes, duplicates of other banks
IPK, DEU	Yes	IPK ,Malchow branch, DEU	CGN in central IPK bank
CGN, NLD	Yes, two places	IPK , DEU and SCRI, GBR	Yes, CPC of SCRI, GBR
INRA, FRA	No	N/A	No
Suceava, ROM	No	N/A	No
VSUZ, SVK	Yes,partly *in vitro*	*In vitro* at PRI, CZE	*In vitro* collection of PRI,CZE
KIS, SVN	Yes, only cultivars	Cultivars at IPK, DEU	No
CPC, GBR	Yes, 70 % of true seeds	CGN, NLD	Part of CGN collection, NLD
PRI, CZE	Yes, *in vitro* & cryo	VSUZ, SVK and RICP, CZE	Yes, VSUZ collection, SVK
NGB, SWE	Yes, base collection	No info	No
CABTFE, SPA	Yes,partly *in vitro*	No info	No
North America			
USDA/ARS, USA	Yes, within USA	NSSL, Colorado, USA (85 %)	No
PGRC3, CAN	No	N/A	No
Asia			
CAAS, CHN	Yes, partly	Partly, elsewhere in China	No info
CPRI, IND	Yes, own institute	Within CPRI, India	No
NIAS, JPN	Not outside own bank	Duplicated in two sub-banks	No

* part of collection duplicated in other collections and not real safety duplication (black box arrangement)

Table 12 Accessibility of germplasm, distribution and information available on Internet

Collection/ Country	Accessibility of germplasm and conditions	Mode distribution	Average annual distribution 2002-04	Data available on own or other Internet site
Latin America				
CIP, PER	Freely & MTA	Seeds /tub/ plantlets	3,000	Partly, incl. Int. datab.
INTA, ARG	Freely & MTA	Seeds, partly plantlets	61	No,incl. Int/Reg datab.
CORPOICA, COL	No Info	Seeds /tub/ plantlets	750	No, incl. Int. datab..
PROINPA, BLV	Decision 391	Tub/ plantlets (partly)	No data	Partly
UACH, CHI	Occasionally	Seeds, partly tubers	No data	No
INIAP, ECU	Own country	Tub/ plantlets (partly)	30	No
INIA, PER	Free, in own cntr	Tubers	130	Partly, CIP
Subtotal			*3,971*	
Europe				
VIR, RUS	Freely, no MTA	Seeds /tub/ plantlets	425	No,incl. Int/Reg datab..
IPK, DEU	Freely & MTA	Seeds /tub/ plantlets	1,535	Yes & Int/Reg datab.
CGN, NLD	Freely & MTA	Seeds/tub (partly)	705	Yes & Int/Reg datab.
INRA, FRA	Exchange&MTA	Tub/ plantlets	300	No,partly Reg datab.
Suceava, ROM	Freely & MTA	Tub/ plantlets	28	Yes & Reg datab.
VSUZ, SVK	Freely & MTA	Tub/ plantlets (partly)	45	No, partly Reg datab.
KIS, SVN	Occasionally	Seeds/tub (partly)	No data	No, partly Reg datab.
CPC, GBR	Freely, no MTA?	Seeds, partly	435	Yes & Int/Reg datab.
PRI, CZE	Freely & MTA	Plantlets (In vitro)	260	Yes & Reg datab.
NGB, SWE	Freely & MTA	Plantlets (In vitro)	No data	Yes & Reg datab.
CABTFE, SPA	Own country	Tubers	23	No
Subtotal			*3,756*	
North America				
USDA/ARS, USA	Freely, no MTA	Seeds /tub/ plantlets	7,630	Yes & Int/Reg datab.
PGRC3, CAN	Freely, no MTA	Tub/ plantlets	315	Partly
Subtotal			*7,945*	
Asia				
CAAS, CHN	Freely & MTA	Plantlets (In vitro)	42	No
CPRI, IND	Freely & MTA	Partly tubers & *in vitro*	732	Partly Int datab.
NIAS, JPN	Freely & MTA	Tubers	14	Yes
Subtotal			*56*	
Total			**16,460***	

* Number of accessions distributed annually by all listed genebank (average over the years 2002, 2003 and 2004)

Table 13 General management of potato germplasm

Yes means, the genebank stated to have written procedures or protocols for the listed genebank functions

Collection/ Country	Acqui-sition	Regena-ration	Characte-risation	Storage	Documen-tation	Health	Distri-bution	Safety duplication
Latin America								
CIP, PER	yes	yes	yes	yes	yes	yes	yes	yes
INTA, ARG	yes	yes		yes	yes		yes	yes
CORPOICA, COL	yes		yes		yes		yes	
PROINPA, BLV	yes	yes	yes	yes	yes	yes		
UACH, CHI	No inf							
INIAP, ECU	yes		yes	yes	yes		yes	
Europe								
VIR, RUS	yes	yes	yes	yes	yes	yes	yes	yes
IPK, DEU	Plan							
CGN, NLD	yes	yes	not applicable	yes	yes	yes	yes	yes
INRA, FRA			yes	yes		yes		
Suceava, ROM	No inf							
VSUZ, SVK	yes	yes	yes	yes	yes	yes		yes
KIS, SVN	yes	yes		yes		yes		
CPC, GBR	No inf							
PRI, CZE	No inf							
NGB, SWE		yes	yes	yes	yes		yes	
CABTFE, SPA	yes	yes	yes	yes	yes	yes		
North America								
USDA/ USA	yes					yes	yes	
PGRC3, CAN		yes	yes		yes	yes		yes
Asia								
CAAS, CHN	yes						yes	
CPRI, IND		yes	yes	yes	yes			
NIAS, JPN	yes		yes				yes	

Annex 5 Information on ECP/GR and APIC databases

Information provided by Roel Hoekstra, CGN, Wageningen

Table 1. Holdings of native cultivars of centres of diversity in European Gene banks and included in ECP/GR database.

Species abbreviation	Species	Subspecies	Series (16)	2n	CGN	CPC	IPK	VIR	POL	HUN	CZE	Total Europe	USA	CIP	Total
2x hybrids			Tuberosa	24	1	11	28	7				**47**		64	**11**
AJH	*ajanhuiri*		Tuberosa	24	2		4	6				**12**	3	13	**28**
PHU	*phureja*		Tuberosa	24	30	128	217	352	6	1	11	**745**	133	170	**1048**
STN or GON	*stenotomum*		Tuberosa	24	27	60	83	195			9	**374**	25	346	**745**
CHA	*chaucha*		Tuberosa	36			6	17			1	**24**	3	163	**190**
JUZ	*juzepczukii*		Tuberosa	36			5	4				**9**	5	35	**49**
4x hybrids			Tuberosa	48	3	3						**6**		25	**31**
TBR	*tuberosum*		Tuberosa	48	11		119	2				**132**			**132**
TBR ssp ADG	*tuberosum*	*andigena*	Tuberosa	48	661	513	1177	2366		1	4	**4722**	781	2881	**8384**
TBR ssp TBR	*tuberosum*	*tuberosum*	Tuberosa	48	3	23						**26**	50	158	**234**
CUR	*curtilobum*		Tuberosa	60		4	8	65				**77**	11	10	**98**
Total					**738**	**742**	**1647**	**3014**	**6**	**2**	**25**	**6174**	**1011**	**3865**	**10950**

Remark: most collections maintain these native cultivars in the form of populations (true seed)

Table 2. Duplication of wild species within and between 8 potato collections
(Only for the accessions included in the database at September 2005)

Genebank/ Country	Total in data base	Internally redundant accessions	Minus redundant	CGN	CPC	IPK	VIR	PI	CIP	BALC-RCE	PRO-INPA	Unique accessions	%. Unique	% Unique of total
CGN/NLD	1951	5	1946		193	389	694	1198	339	661	509	202	10	10
CPC/GBR	736	112	624	193		174	171	263	54	43	31	293	47	40
IPK/DEU	1312	57	1255	389	174		340	612	158	102	71	492	39	38
VIR/RUS	2210	569	1641	694	171	340		1187	285	418	89	388	24	18
PI/USA	3754	50	3704	1198	263	612	1187		622	947	177	1244	34	33
CIP/PER	1785	22	1763	339	54	158	285	622		32	229	935	53	52
BALCAR-CE/ARG	1337	7	1330	661	43	102	418	947	32		10	301	23	23
PROIN-PA/BLV	511	2	509	509	31	71	89	177	229	10		0	0	0
All collections	13596	824	12772									3855	30	28

Remark: Analysis of the data showed that these eight collections maintain 6961 unique accessions (Personal communication Roel Hoekstra)

Table 3. Distribution of wild species over 11 collections (APIC database of wild species, CGN, NLD)

Species abbreviation	Species	Subspecies	Series	BALC ARCE	PRO-INPA	CIP	PI	CGN	CPC	IPK	VIR	POL	HUN	CZE	Total
bxh						1									**1**
dxt						1									**1**
lxa						1									**1**
mxc						1									**1**
nov				12	2	2	44	9		1	1				**71**
oxl						1									**1**
rxs						2									**2**
spp				1		98	32	31	1	18	6				**187**
sxt						1									**1**
CHP	*Chaparense*				1			1		1					**3**
cil	*Chillonanum*						1	1							**2**
PNN	*Pennelli*					1				1					**2**
uyu	*Uyunense*										1				**1**
ETB	*Etuberosum*		1 Etuberosa			2	30	5	1	1	1				**40**
FRN	*fernandezianum*		1 Etuberosa			1	7	2		3					**13**
PLS	*Palustre*		1 Etuberosa	25		2	72	3	5	5			2		**114**
MRL	*morelliforme*		1 Moreliformia			4	26	3		2	1				**36**
BLB	*bulbocastanum*		2 Bulbocastana			6	52	23	3	30	31	1	1		**147**
DPH	*bulbocastanum*	*dolichophyllum*	2 Bulbocastana				5	3		3	2				**13**
PTT	*bulbocastanum*	*partitum*	2 Bulbocastana				2			2	1				**5**
EHR	*cardiophyllum*	*ehrenbergii*	2 Bulbocastana				29	1	10	8	30				**78**
CLR	*Clarum*		2 Bulbocastana				23			2					**25**
JGL	*juglandifolium*		2 Juglandifolia				5								**5**
LYC	*lycopersicoides*		2 Juglandifolia			3	5	3							**11**
OCR	*Ochranthum*		2 Juglandifolia			1	13	2	3	2	1				**22**
SIT	*Sitiens*		2 Juglandifolia			2	5	2							**9**
BST	*brachistotrichum*		3 Pinnatisecta			2	24	3	2	6	25				**62**
CPH	*cardiophyllum*		3 Pinnatisecta			3	20	7	5	10	9				**54**
LCL	*cardiophyllum*	*lanceolatum*	3 Pinnatisecta				1								**1**

JAM	*Jamesii*		3 Pinnatisecta			1	94	4	9	10	34	1			**153**
MCH	*michoacanum*		3 Pinnatisecta				1		1						**2**
NYR	*Nayaritense*		3 Pinnatisecta				6								**6**
PNT	*pinnatisectum*		3 Pinnatisecta			2	18	11	11	21	37	3			**103**
SMB	*sambucinum*		3 Pinnatisecta				1								**1**
TRN	*Tarnii*		3 Pinnatisecta				11	1		4					**16**
TRF	*Trifidum*		3 Pinnatisecta				14	4	5	15	19				**57**
LES	*Lesteri*		4 Polyadenia				3	3		1	6				**13**
PLD	*polyadenium*		4 Polyadenia			5	22	8	3	8	55	1			**102**
CMM	*commersonii*		5 Commersonia	28		46	41	13	8	15	13				**164**
MLM	*commersonii*	*malmeanum*	5 Commersonia	14			21	14	4	7	9				**69**
CRC	*Circaeifolium*		6 Circaeifolia			3	6	2		3	1				**15**
CAP	*Circaeifolium*	*capsicibaccatum*	6 Circaeifolia		8	4	6	9	1	4	5				**37**
QUM	*Circaeifolium*	*quimense*	6 Circaeifolia		5	2	3	5	2	4	1				**22**
SST	*Soestii*		6 Circaeifolia							1					**1**
LGL	*Lignicaule*		7 Lignicaulia			5	4	2	6	2	11				**30**
ARZ	*Arnezii*		9 Yungasensa		1		6	2		4					**13**
CHC	*Chacoense*		9 Yungasensa	92		17	158	116	47	89	142	6		1	**668**
HCB	*huancabambense*		9 Yungasensa			6	6	3		6	5				**26**
TAR	*Tarijense*		9 Yungasensa	47		18	73	49	12	15	64	1			**279**
YUN	*Yungasense*		9 Yungasensa		1	3	1	1		2					**8**
BLV	*Boliviense*		10 Megistacroloba	13		8	23	20	6	11	25				**106**
AST	*Boliviense*	*astleyi*	10 Megistacroloba		5	2	2	5		3					**17**
CHV	*Chavinense*		10 Megistacroloba			2	1	1			1				**5**
HSF	*Hastiforme*		10 Megistacroloba			1	1								**2**
MGA	*megistacrolobum*		10 Megistacroloba	99		23	145	112	7	12	117				**515**
TOR	*megistacrolobum*	*toralapanum*	10 Megistacroloba	4		26	41	30	15	10	13				**139**
RAP	*raphanifolium*		10 Megistacroloba			60	35	21	9	13	36				**174**
SCT	*sanctae-rosae*		10 Megistacroloba	13			12	13	10	8	16				**72**
SGR	*sogarandinum*		10 Megistacroloba			10	2	3	1	4	8	1			**29**
AMP	*anamatophilum*		11 Cuneolata			2									**2**
IFD	*infundibuliforme*		11 Cuneolata	107		6	128	70	6	4					**321**
AGF	*agrimonifolium*		12 Conicibaccata				22	10	2	7	7				**48**

BUE	*Buesii*		12 Conicibaccata			1	2	1							**4**
CCT	*Cacetanum*		12 Conicibaccata				1								**1**
CHM	*chomatophilum*		12 Conicibaccata			60	20	9	3	10	2				**104**
COL	*colombianum*		12 Conicibaccata			17	69	3	1	10	9				**109**
CTZ	*contumazaense*		12 Conicibaccata				1			1					**2**
FLH	*Flahaultii*		12 Conicibaccata			2	8	3		1					**14**
GAB	*garcia-barrigae*		12 Conicibaccata				2	1							**3**
IRS	*Irosinum*		12 Conicibaccata			8	2								**10**
LXS	*Laxissimum*		12 Conicibaccata			3	2	1		2	4				**12**
LMB	*Limbaniense*		12 Conicibaccata			1	1	1		1	2				**6**
LGC	*longiconicum*		12 Conicibaccata				11	3		1	1				**16**
MSP	*moscopanum*		12 Conicibaccata			6	25	3		2	5				**41**
NVL	*neovalenzuelae*		12 Conicibaccata				1								**1**
ORO	*Orocense*		12 Conicibaccata				2	1							**3**
OTI	*Otites*		12 Conicibaccata				1								**1**
OXC	*Oxycarpum*		12 Conicibaccata			1	18	5		10	6				**40**
PPL	*pamplonense*		12 Conicibaccata				2								**2**
PCJ	*Paucijugum*		12 Conicibaccata			9	9	2		3					**23**
SAN	*Santolallae*		12 Conicibaccata			3	3	2	1	2	2				**13**
SUP	*subpanduratum*		12 Conicibaccata			1	1			1	1				**4**
SUC	*sucubunense*		12 Conicibaccata				1	1							**2**
TND	*tundalomense*		12 Conicibaccata			17	5			4	4				**30**
URU	*Urubambae*		12 Conicibaccata			2					1				**3**
VIO	*violaceimarmoratum*		12 Conicibaccata			8	8	5	1	4	7				**33**
ACG	*acroglossum*		13 Piurana			2	2	1			4				**9**
ABZ	*Albornozii*		13 Piurana			2	4	1		3					**10**
BLG	*blanco-galdosii*		13 Piurana			4	4	1		1	1				**11**
CNT	*Cantense*		13 Piurana			4									**4**
CHL	*Chilliasense*		13 Piurana				1								**1**
HCR	*hypacrarthrum*		13 Piurana			7	1			1					**9**
JLC	*Jalcae*		13 Piurana			1									**1**
PCS	*paucissectum*		13 Piurana			10	3	2		2	1				**18**
PUR	*Piurae*		13 Piurana			6	3			4	1				**14**

SOL	*Solisii*		13 Piurana			1	1			1					**3**
TUQ	*Tuquerrense*		13 Piurana			5	20	2	3	4	2				**36**
MAG	*Maglia*		15 Maglia	5		2	3	2		2	3				**17**
ABN	*abancayense*		16 Tuberosa				1	1		1	5				**8**
ACH	*achacachense*		16 Tuberosa		4		1	4		1					**10**
ACS	*acroscopicum*		16 Tuberosa			3	3	1		1	4				**12**
ALN	*Alandiae*		16 Tuberosa			15	17	13	2	8	6				**61**
AML	*Amabile*		16 Tuberosa				1								**1**
AMY	*Amayanum*		16 Tuberosa			2		2							**4**
AMB	*Ambosinum*		16 Tuberosa			13	7	3	1	8	6				**38**
ACP	*Ancophilum*		16 Tuberosa			3		1							**4**
ADR	*Andreanum*		16 Tuberosa			7	25	2		3					**37**
ARP	*aracc-papa*		16 Tuberosa							2	1				**3**
AGU	*Augustii*		16 Tuberosa			1									**1**
AVL	*Avilesii*		16 Tuberosa			3	3	3		3	5				**17**
AYM	*aymaraesense*		16 Tuberosa				1	1							**2**
BER	*Berthaultii*		16 Tuberosa	1		33	62	34	12	12	41	1		1	**197**
BRC	*Brevicaule*		16 Tuberosa	1		9	27	14	2	5	15				**73**
BUK	*Bukasovii*		16 Tuberosa			272	96	22	18	20	38				**466**
MLT	*Bukasovii*	*multidissectum*	16 Tuberosa			4	13	13	12	11	18	2			**73**
CJM	*cajamarquense*		16 Tuberosa			8	2			2					**12**
CAN	*Canasense*		16 Tuberosa			5	21	16	14	18	23				**97**
CND	*candolleanum*		16 Tuberosa		4	16	9	4		6	3				**42**
SHP	*candolleanum*	*sihuanpampinum*	16 Tuberosa			1									**1**
CHN	*chancayense*		16 Tuberosa			2	2	4		2	4				**14**
CHQ	*chiquidenum*		16 Tuberosa			14	7								**21**
COP	*coelestipetalum*		16 Tuberosa			30	5	3	1	4	3				**46**
DDS	*Doddsii*		16 Tuberosa		3	2	13	3	2	4	5				**32**
DCM	*dolichocremastrum*		16 Tuberosa			6	3	1		3	2				**15**
GND	*Gandarillasii*		16 Tuberosa			1	7	3	3	5	6				**25**
GRL	*Gourlayi*		16 Tuberosa	240		17	167	114	5	17	100	1			**661**
PTR	*Gourlayi*	*pachytrichum*	16 Tuberosa		8	6	8	8	1	3					**34**
VID	*Gourlayi*	*vidaurrei*	16 Tuberosa	24		7	20	13		5	2				**71**

GUZ	*guzmanguense*	*(=GZM)*	16 Tuberosa			1										**1**
HAW	*hawkesianum*		16 Tuberosa	7			5	6		6						**24**
HDM	*hondelmannii*		16 Tuberosa			3	16	7	2	7	4					**39**
HPS	*Hoopesii*		16 Tuberosa		4	2	8	4		2						**20**
HRO	*huarochiriense*	*(=HCH)*	16 Tuberosa			8		1								**9**
HMP	*humectophilum*		16 Tuberosa			1		1			1					**3**
IMT	*Immite*		16 Tuberosa			3	4	1		3						**11**
INM	*incamayoense*		16 Tuberosa	10			8	7		3	11					**39**
KTZ	*Kurtzianum*		16 Tuberosa	117			96	69	21	16	94	1				**414**
LPH	*Leptophyes*		16 Tuberosa	2	52	26	25	59	5	9	11					**189**
LPS	*leptosepalum*		16 Tuberosa				1	1		1						**3**
LBB	*Lobbianum*		16 Tuberosa			2	2									**4**
MCP	*macropilosum*		16 Tuberosa				2	1		2						**5**
MRN	*marinasense*		16 Tuberosa			24	15	2	4	4	2					**51**
MED	*Medians*		16 Tuberosa			22	9	6	1	4	11					**53**
ang	*Medians*	*angustifolium*	16 Tuberosa								2					**2**
MCD	*microdontum*		16 Tuberosa	36		9	42	22	22	23	48					**202**
GIG	*microdontum*	*gigantophyllum*	16 Tuberosa	28		6	56	37	22	20	33					**202**
MIN	*minutifoliolum*		16 Tuberosa			2	1									**3**
MCQ	*mochiquense*		16 Tuberosa			7	4	4	1	7	5					**28**
MTP	*multiinterruptum*		16 Tuberosa			58	8	2	3	5	4					**80**
MAT	*multiinterruptum*	*machaytambinum*	16 Tuberosa				2			1						**3**
NCD	*neocardenasii*		16 Tuberosa		1	1	2	1	1	2	2					**10**
NHK	*neohawkesii*	*(=bukasovii)*	16 Tuberosa								2					**2**
NRS	*Neorossii*		16 Tuberosa	2			5	4	3	4	9					**27**
OCM	*Ochoanum*	*(=tuberosum)*	16 Tuberosa								1					**1**
OKA	*Okadae*		16 Tuberosa	12		9	18	19	6	5	19					**88**
OPL	*Oplocense*		16 Tuberosa	42		20	63	51	9	14	68					**267**
ORP	*Orophilum*		16 Tuberosa			15	8	1		3	2					**29**
PAM	*pampasense*		16 Tuberosa			2	3	4	4	4						**17**
PRM	*paramoense*		16 Tuberosa				2									**2**
PRV	*parvicorallatum*		16 Tuberosa								1					**1**
RCH	*Rechei*		16 Tuberosa	11			4			2						**17**

RGF	*regularifolium*		16 Tuberosa			1									**1**
RZL	*ruiz-lealii*		16 Tuberosa					1							**1**
SND	*Sandemanii*		16 Tuberosa				1	1	1	3	1				**7**
SCB	*Scabrifolium*		16 Tuberosa			1	1				1				**3**
STL	*setulosistylum*		16 Tuberosa					1		2					**3**
SPL	*Sparsipilum*		16 Tuberosa	4		48	82	47	29	39	53			1	**303**
SPG	*Spegazzinii*		16 Tuberosa	72			65	66	14	43	90			1	**351**
SUB	*subandigena*		16 Tuberosa							2					**2**
SCR	*Sucrense*		16 Tuberosa			20	40	52	10	8	15				**145**
SFF	*suffrutescens*		16 Tuberosa			2									**2**
TCN	*Tacnaense*		16 Tuberosa						1						**1**
TBR	*Tuberosum*		16 Tuberosa				1			1					**2**
UGT	*Ugentii*		16 Tuberosa		2	2	5	3		2					**14**
VLR	*Velardei*		16 Tuberosa			4		1							**5**
VNT	*Venturii*		16 Tuberosa	7			6	4	1	5	3				**26**
VRN	*Vernei*		16 Tuberosa	30		1	31	25	8	19	35				**149**
BAL	*Vernei*	*ballsii*	16 Tuberosa	8		1	9	3		6	17				**44**
VER	*Verrucosum*		16 Tuberosa			2	43	18	24	12	26	1			**126**
VRG	*Virgultorum*		16 Tuberosa		5	1		7	1	2	1				**17**
WBR	*weberbaueri*		16 Tuberosa			1	1	1	1	2	1				**7**
ACL	*Acaule*		17 Acaulia	201		323	388	281	37	52	268				**1550**
AEM	*Acaule*	*aemulans*	17 Acaulia	22			19	15	19	4	6				**85**
PAL	*Acaule*	*palmirense*	17 Acaulia			1	1	1							**3**
PNE	*Acaule*	*punae*	17 Acaulia				12	5	1	5	7				**30**
ALB	*Albicans*		17 Acaulia			49	22	10	1	4	18				**104**
CDL	*candelarianum*	*(=stoloniferum)*	18 Longipedicellata			2	1			1					**4**
FEN	*Fendleri*		18 Longipedicellata			11	89	6	26	15	32				**179**
AZN	*Fendleri*	*arizonicum*	18 Longipedicellata				7	1		2	3				**13**
HJT	*Hjertingii*		18 Longipedicellata				11	8	6	9	12				**46**
PTA	*Papita*		18 Longipedicellata				29	5	18	6	24				**82**
PLT	*Polytrichon*		18 Longipedicellata			11	43	7	13	13	29	2			**118**
STO	*Stoloniferum*		18 Longipedicellata			7	127	12	45	96	64	1			**352**
MLA	*Stoloniferum*	*moreliae*	18 Longipedicellata						1						**1**

VLL	*vallis-mexici*		18 Longipedicellata								3				**3**
BCP	*brachycarpum*		19 Demissa			2	53	5	15	25	15				**115**
DMS	*Demissum*		19 Demissa			13	156	84	65	174	63		1		**556**
EDN	*Edinense*		19 Demissa				3			3					**6**
GRR	*guerreroense*		19 Demissa				2	2	1	3	2				**10**
HOU	*Hougasii*		19 Demissa			6	14	2	5	6	4				**37**
IOP	*Iopetalum*		19 Demissa			4	7	3	4	4	4				**26**
SNK	*Schenckii*		19 Demissa			1	14	1	3	8	6				**33**
SEM	*semidemissum*		19 Demissa						1						**1**
Hybrids					8		1	11	3						**23**

Table 4. Holdings of European cultivars and breeding stocks of European genebanks and NR6/ARS and included in the ECP/GR database (SASA, UK)

Genebank/	Country code	No. of cultivars	No. of breeding stocks	Total number of accessions
ARCHE NOAH	AUS	268	8	276
HBROD	CZE	938	5	943
IPK	DEU	1979	341	2320
INRA-179	FRA	880	2	882
SASA-165	GBR	932	71	1003
HUN-052	HUN	88	41	129
DEPT	IRL	339	0	339
IRL001	IRL	369	0	369
CPVPA	ITA	184	90	274
NLD breeders	NLD	106	84	190
POL IPR BON	POL	1203	28	1231
VIR-RUSSIA	RUS	1839	345	2184
NEIKER	SPA	217	11	228
NGB-002	SWE	56	7	63
NR6/ARS	USA	311	377	688
Total		**9,709**	**1,410**	**11,119**

Annex 6 Capacity for providing services/sharing responsibilities (25/08/2005)

6a NEEDS for strengthening capacity in conservation activities

1 = urgent 2 = medium 3 = no need

Collection/ Country	Conser-vation	Regene-ration	Characte-ristaion	Safety duplication	Health Screening	*In vitro* con-*servation*	Cryo pre-servation	Distri-butio n	Train-ing	Documen-tation
Latin America										
CIP, Peru	3	3	3	3	3	3	2	3	3	3
INTA, Argentina	2	**1**	2	**1**	2	3	3			**1**
CORPOICA, Columbia	3	3	**1**	2	**1**	3	2	3	**1**	2
PROINPA, Bolivia	3	**1**	3	**1**	**1**	2	2	2	3	3
UACH, Chile	**1**	**1**	2	2	**1**	2	2-3			**1**
INIAP, Ecuador	3 seeds 2 invitro	**1**	3 field **1** mol	2	**1**		3	2	2	**1**
Europe										
VIR, Russia	2	**1**	3	3	**1**	3	3	2	**1**	2
IPK, Germany	3	3	3	3	3	3	3	3	3	3
CGN, Netherlands	3	3	3	3	3	3	3	3	3	3
CPC, UK	2	3	2	2	3	3	3	3	3	2
North America										
USDA/ARS, USA	No info									

6b OFFERS and facilities/expertise that could be shared

X means that the genebanks offer facilities or expertise for the listed genebank functions. Conditions need to be further discussed with the respective genebanks

Collection/ Country	**Conser-vation**	**Regene--ration**	**Characte-ristaion**	**Safety duplicatio n**	**Health Screening**	***In vitro***	**Cryopr e-servati on**	**Distri-bution**	**Training in PGR manag**	**Documen-tation**
Latin America										
CIP, Peru	Capacity building, training, storage space	Training	Training Screening technics	Capacity building	Training: methods	Training : method s	Training : basic protocol	X	Quality control training	Training: up-to-date informatics methods
INTA, Argentina				X		X		X	X	X
CORPOICA, Columbia	X	X								
PROINPA, Bolivia						Technic s / protocol s			PGR managem ent (cult. Sp.)	
UACH, Chile								X	X	
INIAP, Ecuador	TPS duplicates cons	Field	Molecular markers	TPS duplication		Room for duplicat es			Charact, cons, in situ, statistics	
INIA, Peru	No info									
Europe										
VIR, Russia			X	X			X	X		X
IPK, Germany				X			X		X	
CGN, Netherlands				X				X	X	X
CPC, UK		X	X	X					X	
North America										
USDA/ARS, USA	No info									

Annex 7 Pre-proposals developed by the participants during the "Workshop of Potato Ex situ Curators" at CIP Lima from 24 to 26 August, 2005

The consultant has edited these pre-proposals without intended effect on the contents

1. Documentation

Title: **Development of a comprehensive World Potato Genetic Resources Database for wild potato species and native cultivated forms.**

Implementing /coordinating institutes: CIP will coordinate this proposal with assistance of CGN and USDA

- Focal person: Reinhard Simon (CIP, Peru)
- Task force: Reinhard Simon (CIP, Peru), Roel Hoekstra (CGN, The Netherlands) and John Bamberg (USDA)

Participants: potato genetic resources collection holders, willing to share information for international utilisation
Time frame: initial 1-2 years
Objective: Improvement of the information on potato genetic resources in integrated databases at the global level
Expected results, process and activities
A. Assessment phase for the development of a full project:

- Assessment of local needs for computerization of data, by means of a survey at the global level facilitated by the information obtained through the potato questionnaire.
- Development of an optimal database format by the task force, based on the available databases of APIC, the ECP/GR potato working group, CIP and others.

Duration: one year; it was suggested that a meeting of the relevant stakeholders could be organized during the *Solanaceae* meeting planned 23-28 July 2006 in Madison, USA.
Budget: Several envisaged project partners plan to participate in the *Solanaceae* meeting. It is suggested to allocate US $ 5000 for some participants who have no travelling funds available and can provide a substantial contribution to the achievement of the objective.
B. Implementation of proposal in second phase (2006-2009)

- CIP is proposed to coordinate the APIC database of wild species of the centre of diversity. Further discussions required with CGN, presently responsible for the APIC database of wild species.
- The proposed structures agreed upon during the assessment phase in 2006 will be implemented
- The survey will provide the information for the upgrading of the present databases along the following lines:
    - Updating with new accessions and data of the potato collections (8) already included in the APIC databases;
    - Inclusion of data of collections (c.6-10) who have not provided information before;
    - Inclusion of new fields of interest to the rational conservation strategy of the potato genetic resources (e.g. health information, conservation aspects such as availability, safety duplication, etc.)
- The renewed database will be the central tool for rationalization of the collections.
- Capacity building for further development of the databases will be also necessary, e.g. funds for computerizing data, organising a meeting/training.

Budget components (estimated);

- Handling and uptake of information provided by all participants, This activity will be supported by CIP but a financial subsistence of US $ 10.000 should be considered

- Providing computerized data by partners, estimated total cost US $12.500; more precise information will be available after the survey.
- Capacity building, estimated US $ 15.000

Total estimated contribution from the Trust: US $ 37.500

2. Conservation standards

Title: Establishment of conservation guidelines and sustainable upgrading the management of potato genetic resources collections

Implementing /coordinating institutes: CIP will coordinate this proposal
- Focal person: Ximena Cadima (PROINPA, Bolivia)
- Task force: A. Panta (CIP, Peru), Ximena Cadima (PROINPA, Bolivia), Andres Contreras M. (UACH, Chile), Alberto Salas (CIP, Peru)

Participants: Bolivia (PROINPA), Chile (UACH), Columbia (CORPOICA), Ecuador (DENERA/ INIAP), Peru (INIA), Russia (VIR) and CIP (Peru). Interested potato gene banks in the world may participate in the process of developing the standards.
Time frame: 3 years
Objectives: Elaboration of standard guidelines and upgrading potato genetic resources long-term conservation in potato gene banks worldwide
Process and activities:
1. Development of basic guidelines for the conservation of wild and of cultivated species: production of a draft version by the task force, review by all concerned potato curators (including through a dedicated workshop), and publication in a booklet. $25,000 is suggested for funding this activity. Components of the guidelines: optimal regeneration methods for all potato germplasm, germination requirements, storage facilities and safety duplication, etc.
2. Define basic needs and set priorities for each genebank. Funds should be allocated according to the needs and collection size of each genebank.
3. Capacity building and upgrading of gene banks providing minimum facilities required for long-term conservation (estimated total amount US $ 125.000 for all gene banks). *In vitro* and seed storage facilities and transferring of clonal accessions from field to *in vitro* storage shall have priority. This activity would include implementation of basic activities applying standard guidelines

Total estimated cost for the trust: US $ 150,000
Remark: the task force needs to assess the basic needs for each of the recipients and total cost need to be specified. Considering the high costs, other funding sources will be explored for continuing the conservation in subsequent years.

3. Rationalisation

Title: Rationalisation of native cultivars from the centres of origin

Implementing /coordinating institutes: CIP will coordinate this proposal
- Focal person: Carlos Arbizu (CIP, Peru)
- Task force: Carlos Arbizu (CIP, Peru), Klaus Dehmer (IPK, Germany), (A. Espinoza will provide name for Mexico) and C. Zorrilla (CIP, Peru)

Partners: Argentina (INTA), Bolivia (PROINPA), Chile (UACH), Colombia (CORPOICA), Ecuador (DENERAF), Russia (VIR) Additionally partners: Tenerife (CABTFE) & Venezuela.
Time frame: it is estimated that the duration of the project will be 2-3 years.
Objective: Verification of duplicates in the collections of native cultivars of 6/8 countries

Process and activities:
According to the questionnaire and other information initially 6,000 accessions of native cultivars may be included in a rationalisation effort. To identify probable duplicates the following strategy is proposed:

Digitalisation of passport data and morphological descriptions currently available on cards or other formats; the VIR morphological information would need codification before digitalisation.

Validation of morphological descriptors on field collections of collections included in the project by the use of CIP minimum standard descriptors (most used and most stable). Current descriptor list needs to be translated into English before it can be used and distributed. Exchange of information electronically.

Carry out first comparative exercise using the electronic passport and morphological data. Exchange of the resulting analysis electronically.

Extract DNA from the accessions (we estimate 1000 accessions organized into morphological groups). Send DNA samples to CIP for molecular analysis.

Carry out the molecular analysis using SSR markers available at CIP. Work to be conducted mainly at CIP.

Final identification of genetic duplicates using the passport, morphological and molecular data.

A workshop should be held at CIP before the project is implemented to discuss and agree on methodologies and procedures.

Budget components (estimated)

- Activity 1: US $10,000
- Activity 2: US $ 140,000
- Activity 3: US $ 5,000
- Activity 4 and 5: US $ 30,200
- Activity 6: US $ 2,500

Total Budget: US $ 187,000 over 3 years plus backstopping as contribution.

4. Regeneration needs

Title: Regeneration of endangered potato accessions

Implementing /coordinating institutes: INTA will coordinate this proposal

- Focal person: Andrea Clausen (INTA, Argentina)
- Task force: Andrea Clausen (INTA, Argentina), Alvaro Monteros (DENAREF, Ecuador) Gavin Ramsay (CPC, UK), Stepan Kiru (VIR, Russia)

Partners: Argentina (INTA), Bolivia (PROINPA), Chile (UACH), Colombia (CORPOICA), Ecuador (DENAREF/ INIAP), CIP (Peru) for use of the databases, Russia (VIR) and others
Time frame: 3-5 years
Objective: To safeguard unique potato genetic resources which need urgent regeneration
Process and activities:

1) Identify unique material which has a high priority for regeneration; the participating collections can produce these priority lists from their collections.
2) The overall priority of the selected accessions should be clarified by comparing with the international databases.
3) Both wild relatives and vegetatively propagated potato species will be included
4) Gene bank management and facilities need to be improved in some gene banks (capacity building).
5) The questionnaire estimated that in the participating genebanks 2,000 accessions of wild species and 2,200 accessions of native cultivars from the centre of origin approximately need urgent regeneration. Considering that the duplication rate is approximately 50% between these collections it would mean that 1,000 accessions of

wild species and 1,100 accessions of native cultivars need to be urgently regenerated.
6) The regeneration should be followed by safety duplication, applying the black box principles.
7) The regeneration should also consider the health aspects of the material.

Budget components (estimated);

1. Workshop to develop the project proposal and to identify the priorities of material to be regenerated (US $ 7.000)
2. Capacity building, upgrading facilities;, costs to be identified by partners
3. Estimates of regeneration costs on the basis of US $ 20 per accession of wild species (US $ 20.000) and US $ 30 for vegetative material (US $ 33.000).

Total estimated cost for the Trust: US $ 60.000, excluding cost of capacity building and upgrading the facilities (to be identified for each participating potato genebank)
Remark: considering the potential high cost of budget component 2 it would be advisable to search for additional funding sources

5. Health screening

Title: Health improvement of potato germplasm collections for long-term conservation

Implementing /coordinating institutes: CIP will coordinate this proposal

- Focal person: Enrique Chujoy (CIP, Peru)
- Task force: Enrique Chujoy (CIP, Peru), Valeriano Huanco Sacachipana (INIA, Peru), Ana Panta (CIP, Peru)

Participants: Bolivia (PROINPA), Chile (UACH), Colombia (CORPOICA), Ecuador (DENAREF/ INIAP), Peru (CIP & INIA), Russia (VIR), INTA (Argentina)
Time frame: 5 years

Objectives: to identify and limit pathogen infections, which hamper distribution and utilization of potato accessions, in order to safeguard this germplasm for the future.
Process and activities:

1. Diagnostic inventory of the collections in order to identify the health status of the participating collections. Consider about $2,000 per genebank to hire a person to make the inventory and publish it.
2. Setting priorities for pathogen elimination according to genebanks needs, particularly for clonally propagated native cultivars. Materials regularly requested for distribution would have higher priority.
3. Devise a system for cost efficient pathogen testing and elimination of native cultivars of Latin American countries on a project basis; CIP could play an important role in this activity, based on previous experience to produce clean material and assist in local capacity building; $7,000 in total per country, $ 5.000 for upgrading pathogen testing and elimination infrastructure, and $ 2.000 $ for training.
4. Pathogen testing/elimination according genebank priorities and needs:
   4.1. Pathogen testing of wild species, at least for pathogens of quarantine importance ($5 for PSTVd and PVT testing).
   4.2. Pathogen testing/elimination of clonally genotypes, US $ 40 /accession. According to the questionnaire, the seven gene banks involved in this activity comprise 11, 259 clonally propagated accessions (see attached table on composition and size of potato collections). Assuming that 50% of the accessions is duplicated, the total number qualifying for cleaning would be 5,630. During 5 years, 1,126 accessions would be cleaned per year with support from institutions that currently have facilities for cleaning (i.e. PROINPA, INTA and CIP). The cost reflected here are those of CIP in Peru and would be adjusted according to the respective country. The bulk of the cost includes: a) the detection kits, b) growing

plants and conducting the host range test in greenhouses, c) pathogen elimination in tissue culture laboratory, d) re-testing for viruses.

Total estimated cost for the trust: US $ 300,000 for the four cost components (see attached tables).

Remark : reduction of cost may be considered as follows:

- Contribution in-kind by CIP on making available diagnostic kits for capacity building
- Start first with the group of native cultivars. It is estimated that in this case about 3000 accessions need to be cleaned which will reduce the initially cost of this proposal with US $120.000.
- Further prioritizing the number of accessions by identifying duplicates (see also pre-proposal Rationalisation)
- In the final session of the workshop, participants indicated that this proposal might not have the highest priority as long as the collections are well conserved; but the efforts will be needed in order to make collections available for use.

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Annex 8 List of countries and the ITPGFA – 18/11/2005

	Country	Signed - date	Ratified - date
	Argentina	10/06/2002	-
	Bolivia	No information	No information
	Bulgaria	-	29/12/2004
	Brazil	10/06/2002	-
	Canada	10/06/2002	10/06/2004
	Chile	04/11/2002	-
	China	No information	No information
	Colombia	30/10/2002	-
	Czech Republic	-	31/04/3005
	Ecuador	-	07/05/2004
	France	06/06/2002	11/07/2005
	Germany	06/06/2002	31/03/2004
	Hungary	-	04/03/2004
	India	No information	No information
	Ireland	10/06/2002	10/06/2002
	Japan	06/06/2002	31/03/2004
	Mexico	No information	No information
	The Netherlands	06/06/2002	18/11/2005
	Peru	08/10/2002	05/06/2003
	Poland	-	07/02/2005
	Romania	-	31/05/2005
	Russia	No information	No information
	Slovakia	No information	No information
	Slovenia	No information	No information
	Spain	06/06/2002	31/03/2004
	Sweden	06/06/2002	31/03/2004
	Ukraine	No information	No information
	United Kingdom	06/06/2002	31/03/2004
	USA	01/11/2002	-
	Venezuela	11/02/2002	17/05/2005

Annex 9 Genetic Resources collections of major importance for conservation

Collections (Country)	Collection size	Composition collection	Human capacity	Regeneration procedures	Data documentation	Access to and use of collections	Storage facilities	Safety duplication
USDA/ARS, USA	5,659	A	A	A	A	A	A	A
IPK, DEU	5,894	A	A	B	A	A	A	A
CIP, CGIAR	10,308	A	A	A	C	A	A	B
CGN, NLD	2,716	B	B	B	A	A	A	A
CPC, GBR	1,604	B	B	B	B	B	A	A
INTA, ARG	2,011	B	C	B	A	B	A	B
CPRI, IND	2,628	B	B	B	C	B	A	B
NIAS, JPN	1,843	C	?	A	A	C	B	B
PRI, CZE	2,045	C	B	B	B	B	?	B
INRA, FRA	6,450	B	B	B	C	B	B	D
PROINPA, BLV	2,207	C	C	B	C	?	B	C
CORPOICA, COL	1,159	C	B	B	D	B	A	D
VIR, RUS	8,800	A	B	D	C	B	C	C
INIA, PER	630	C	C	B	D	C	B	C
INIAP, ECU	511	C	D	C	C	C	C	C
UACH, CHI	2,097	C	D	C	D	?	A	D

Meaning of scores:
A = excellent
B= good
C= average
D= poor

Annex 10 Solemn Undertakings

10a. Solemn Undertaking for ensuring access as interim to ratifying the International Treaty for PGRFA

Solemn Undertaking (Access)

The Global Crop Diversity Trust is currently considering making a grant to the …(*institution*)… for upgrading the conservation and management of its …(*crop*)... collection of plant genetic resources for food and agriculture (PGRFA) to international standards. The …(*institution*)… hereby undertakes that, in the event that the grant is approved, the PGRFA covered by the grant that are of crops included in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (the International Treaty), will be made available for the purpose of utilization and conservation for research, breeding or training for food and agriculture in accordance with the terms and conditions set out in Part IV of the International Treaty. The award of any grant by the Global Crop Diversity Trust will be contingent upon the …(*institution*)… signing this Undertaking. This Undertaking will apply until such time as the host country becomes a Contracting Party to the International Treaty.

Signed …….. Title ……. on ……

(Authorized Person responsible for the ……institution)

I, being the Minister/Government Officer responsible for plant genetic resources for food and agriculture in …(*country*)…, hereby confirm that there are no legal obstacles to the …(*institution*)… fulfilling its undertaking as above.

Signed …… on ……..

Minister/Government Officer responsible for plant genetic resources for food and agriculture, …(*country*)…

10b. Solemn Undertaking of commitment to the collection being maintained for long-term conservation

Solemn Undertaking (Conservation)

The Global Crop Diversity Trust is currently considering making a grant to the …(*institution*)… for upgrading the conservation and management of its …(*crop*)... collection of plant genetic resources for food and agriculture (PGRFA) to international standards. The …(*institution*)… hereby undertakes that, in the event that the grant is approved, the PGRFA covered by the grant that are of crops included in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (the International Treaty), will be conserved by the …(*institution*)… on a long term basis. The award of any grant by the Global Crop Diversity Trust will be contingent upon the …(*institution*)… signing this Undertaking.

Signed …….. Title ……. on ……

(Authorized Person responsible for the ……institution)