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Operational genebank manual ACW

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Operational genebank manual of ACW

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1 Germplasm Acquisition and Accessioning

Genebanks can obtain the germplasm they want to conserve through a number of different ways. Conducting collecting missions is possibly the best way of acquiring germplasm material in the most reliable manner. Germplasm exchange with other genebanks is a third route to add genetic diversity to the collection. Obtaining and storing germplasm from researchers and plant breeders is another route to acquire genetic material. Such acquisitions should be guided by a formal mandate that the genebank concludes with its host organization or government and that provides the basis for a genebank acquisition policy. The actual accessioning of acquired germplasm samples, i.e. formally including it into the collection with its unique accession number, is a complex process during which the curator has to check a number of aspects such as the verification of the identity of the material, the health status, the availability of pertinent information, etc. It is further understood that also legal aspects form part of this activity, e.g. was the material collected/obtained in legal manner, are there any restrictions on its use, etc.

Box 1.1 Germplasm Acquisition and Accessioning

GA1 - Briefly describe any formal mandate that your genebank might have concluded with or received from your "mother organization" (e.g. institute, governmental body).
(*This description should include details on:*

a) *which species you conserve and make available;*
We conserve and make available: cereals (>10 000 accessions), maize (380), vegetable (500), Fodder crop (160), soybean (36), vine (350 accessions), berries (100) and potatoes (100) (http://www.bdn.ch/conservation/)

b) *who decides on what your mandate is and, if different,*
The National Genebank is a part of the Research Station AGROSCOPE Changins-Wädenswil (ACW) and is located in Nyon. No formal mandate from our governmental body.

c) *from whom do you received the mandate;*
From the Research Station Agroscope (Institute)

d) *the main aspects of the mandate; and*

e) *legal considerations on PGR as foreseen in national legislation).*
One article mentioned, that the Government can support the conservation of precious local varieties. But as the Genbank was an important element of the plant selection, it was never the question to stop the activities of the Genbank, but also no official mandate.
In the new agricultural policy 2014 to 2017 (dispatch: Botschaft zur Weiterentwicklung der Agrarpolitik in den Jahren 2014 – 2017), there is a specific article on genetic resources (Art. 2.6.3): on the one hand, the government hold themselves a Genebank and on the other hand they implement the National Plan of Action for the conservation and utilization of plant genetic resources in the sense of a Public-Private-Partnership. There isn't specified which species to conserve and make available.

GA2 – Specific agreements. Does your genebank have any specific formal agreements with other genebanks regarding the conservation of specified germplasm?
(*This should include:*

f) *whether or not your genebank has any international agreements to conserve specified germplasm on behalf of other countries,*
g) *a specific region, and/or*
h) *the world*), and
i) *which crops or genepools fall under these agreements?*

No, specific agreements.

GA3 -In case your genebank has a germplasm acquisition policy, what does the policy entail?.

j) please specify which crops or which geographic area, if applicable.

The Genebank has no specific acquisition policy. Landraces and old Swiss varieties from a broad range of species have been collected over the last one hundred years. Collecting is a still ongoing process, we include "new" Swiss varieties, Clones, old Swiss varieties and local Swiss varieties found by chance or conserved by NGOs or in other genebank.

GA4 – How do you verify the identity of the germplasm material received (e.g. relying on the donor's information, comparing material with other accessions, involving (taxonomic) expertise, etc.)?

Each accession that is supposed to be included into the collection is firstly grown in a field nursery or in the greenhouse to determine its taxonomic status and to compare the material with other accessions. Potatoes and berries are analyzed genetically before including in the Genebank (*in vitro* collection). Grape vines are observed and identified in the vineyard before integrated into the colletion.

GA5 – Describe if and how you conduct an assessment of the various quality aspects of the seeds, tissue culture or plant material received.

(*This description includes:*

k) *quality aspects related to the correct identification of a given accession, but also*
l) *health*
m) *purity aspects of the sample/accession*), and
n) *use of a quality control system (e.g. ISO).*

Visual control of the seeds and the plant material for health and purity aspects. Germination tests of the seeds.

GA6 – Describe whether and how the SMTA is being implemented

o) Extent of materials covered by SMTA (crops, numbers of accessions)
p) Ways of SMTA implementation and documentation of transfers of PGR
q) *Other aspects (e.g. monitoring, supervision)*

SMTA is implemented since December 2007; all accessions including non-annex 1 cops are provided under the SMTA regulations.

Box 1.2 Germplasm Collecting

GC1 – Describe here the details of the strategy that you follow in implementing germplasm collecting missions.

(*This description should include:*

a) *general aspects of planning and implementing a collecting mission,*
b) *the criteria you use for priority setting;*
c) *the actual strategy followed in sampling material from farmers' fields, from nature, etc.; and*
d) *how your germplasm acquisition policy underpins the mission*).

No special missions for collecting crops. Whenever some material is recognized as local or old Swiss varieties, the material is included in the Genebank (by chance: in other Genebanks and we are in constantly contact with the NGO's in Switzerland).

SE2 – Provide any additional information on the germplasm collecting activities of your genebank, including the collaboration with others.

2 Ensuring Security

This chapter refers to the security of the genebank structure itself (i.e. its physical security), the safety of its germplasm (i.e. the maintenance of viability) as well as the institutional and personnel security, aspects which together will ensure the long-term conservation of the entire collection.

2.1 Physical Security

To ensure the physical security of the collections, the following aspects are regarded as essential elements for achieving the objective:

Box 2.1.1 Safety Duplication (of long-term conserved germplasm)

SD1 - Please describe how your genebank implements the safety duplication of your germplasm material.

(*This description should include the following aspects:*

a) The type of safety duplication (e.g. black-box; no specific arrangement; other);

SEEDS: black-box, Safety duplicates from recent multiplications (not older than two years) are sent to Svalbard. *In vitro* material: duplications in the field, managed by NGOs. Vine: material is planted in 3 other field collection (managed also by NGOs) dispatched in the country.

b) The location(s) where you store your safety duplicates (country; genebank);

SEEDS: Safety duplicates from cereals sent to Svalbard. Seeds with reduced longevity (e.g. as beans) are duplicated in the Botanical Garden in Geneva (Conservatoire et Jardin Botaniques de la Ville de Genève). Field collection dupicata dispatched over the country.

c) *Whether or not you are using a formal agreement with the genebank(s) that store your duplicates?* No formal agreements with the Botanical Garden, but formal agreements between the Federal Office of Agriculture and the NGOs.

d) Whether the safety duplicates are stored under conditions comparable to your own? Please provide details;

SEEDS are stored at –18°C and field collection corresponding to detailed specification (available in french and german at http://www.cpc-skek.ch/deutsch/nap_projekte/konzepte_und_richtlinien.html and after 2014 : www.bdn.ch)

e) *Do you maintain safety duplicates from other genebanks at your genebank? If so, do you know any details of that material?*)

Yes, from ICARDA, Lathyrus-Collection and forage crops from Belgium.
For the Lathyrus-Collection we have a list with passport and evaluation data.

SD2 – Do have a safety duplication policy? If so, please provide essential details.

No, we don't have safety duplication policy.

Box 2.1.2 Structure

SS1 - Please provide details on how your genebank building has been designed to resist natural disasters (e.g. earthquakes; flood; storm).

Switzerland is not located in an earthquake area; no high wind/storm exposure; standard construction.

SS2 - Please describe the security arrangements that you have in place to protect your genebank against burglars, fire and others.

(*Please include details on the following arrangements, as applicable:*

a) *Fences;*
b) *Security doors;*
c) *Alarm system;*
d) *Fire detectors;*
e) *Standby generator;*
f) *Others (please specify*).

Locked doors; Alarm system for temperature deviations in cold stores, Fire detectors in the building. Two generators for the cooling are used and each can assure the maintenance at -18°C. In case of a blackout the isolation is such that the temperature rises only very slowly. In case of blackouts, the standby generator will automatically kick in.

SS3 – Please provide information on any other structural security aspects that you might have in place.

Access and admission of authorized staff only.

Box 2.1.3 Security Equipment

SE1 - Provide details on the kind of emergency (back-up) equipment or arrangements that you have in place to ensure permanent electricity and cooling.

(*Aspects to consider are:*

a) *"back-up" compressors for your cold rooms;*
b) *generator;*
c) *regular maintenance and trial runs;*
d) *other*).

A system of alarm for temperature deviations in cold stores exists; backup generator is in place and will automatically kick in in case of blackouts; regular maintenance and trial.

SE2 – Describe how you monitor temperature and relative humidity in your cold stores and drying room?

Weekly control by staff.

Box 2.1.4 Institutional and Personnel Security

IPS1 – Provide details on the "institutional security", in particular with respect to the provision of financial means to operate the genebank

(*Aspects to consider are:*

a) *timely transfer of funds from the "mother" organization to the genebank;*
b) *do you have direct access to the "mother" organization that provides the budget?;*
c) *internal "security" of accessing these funds;*
d) *long-term security and stability of funding (compensation of inflation rates, avoiding variation in years)*
e) *any other observations that are relevant in this context)*.

The management of the Genebank is assured by a fixed budget of the institute.

IPS2 – Describe how you secure adequate staffing of your genebank is?

Staff is secured by permanent work contracts.

Box 2.1.5 Contingency Plans:
CP1 - Describe the kind of emergency or contingency plan that your genebank has in place to cope with disaster situations.
No contingency plan available.

CP2 - Provide information on the kind of training, security drills and other activities that your genebank gives to its staff to deal with emergency situations, if any.
Staff is informed and trained regularly about emergency situations like fire and health hazards.

3 Germplasm Maintenance

This chapter deals with key aspects of managing germplasm in a genebank, i.e. the maintenance of the viability, the genetic integrity, the availability of the conserved germplasm as well as the management of the corresponding information. Given the fact we are covering seed, in vitro cultures and entire plants it might well be that not all aspects are covered by one and the same genebank. In those cases it is suggested that only the applicable sections are completed. Accordingly, at the beginning of each section of this chapter you will find a "navigation box" (highlighted in yellow) that will help you as user of the template to complete the correct section(s).

3.1 Maintenance of Viability

This section refers to the maintenance of the longevity of the seeds or of tissue cultures or living plants in storage. A high initial viability is the most important pre-condition for achieving the longest lifespan of seed accessions in storage, hence maximum efforts need to be taken to ensure that seeds to be stored have the highest possible viability. Optimum growing conditions when multiplying/regenerating the accessions, efficient management of the preparatory steps before storing the germplasm, adequate storage conditions as well as proper monitoring of the viability are critically important.

Navigation Box on Maintaining Viability section

Seed – If applicable, please complete the section on Maintaining Viability for the activities related to seed genebanks (i.e. boxes 3.1.1.A – 3.1.3.A)

In vitro cultures – If applicable, please complete the section on Maintaining Viability for the activities related to in vitro culture (i.e. boxes 3.1.1.B – 3.1.3.B

Cryopreservation – If applicable, please complete the section on Maintaining Viability for the activities related to cryopreserved collections (i.e. boxes 3.1.1.C – 3.1.3.C)

Field genebanks – If applicable, please complete the section on Maintaining Viability for the activities related to field genebanks (i.e. boxes 3.1.1.D – 3.1.3.D.

Seed Collections

Box 3.1.1.A Initial seed viability
IV1 - Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your seed, in particular during regeneration and post-harvest (e.g. cultivation practices, pollination aspects, use of specific equipment as shelters, storage of harvested seeds, cleaning, etc.).
Reproduction protocols are in preparation (cultivation, pollination, pre- and post harvest treatments, etc.) for all crops. They will be internally available (only in French).

IV2 – Describe procedures how you deal with a) dormancy and b) hard seeds?
Protocols in preparation for seed pre-treatment (cold treatment) internally (only in French) available
IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial viability.
Harvest and post harvest treatment as gentle as possible (crop specific protocols only in French)

Box 3.1.2.A Seed Viability Monitoring
VM1 - Describe the routine seed viability monitoring system that you use.
(*The monitoring system should include the following aspects:*

a) *frequency of testing;*
b) *sampling method applied;*
c) *any thresholds that you use;*
d) *whether you apply different procedures for crops/species with erratic initial viability or irregular viability lifespan;*
e) *etc*).

Crop specific protocols for germination testing internally will be available (only in French), we are following ISTA standards adopted for Agroscope.

VM2 - Please describe the information "system" that you might have in place that allows you to make more species or even accession-specific decisions when the next monitoring should take place.
Following a species-specific schedule (to be defined) germination tests are performed.

VM3 - Please provide information on non-specific thresholds that you might use for viability of seeds (i.e. percentage of germination) and for the amount of seeds left of an accession to initiate regeneration? *In case you differentiate between self- and outbreeding species, please answer for each category separately.*
Generally, a regeneration is planned when germination rate falls below 70% or when the remaining seed stock in the medium-term collection is falling under two regeneration cycles.

Box 3.1.3.A Seed Storage Conditions (for the different types of collections, i.e. short/medium- or long-term storage)
SC1 - Please provide details on temperature and relative humidity conditions of your storage and drying rooms. In case they vary from room to room, please provide details for each.

Active collection (Short and medium term storage:
Short and medium storage at +4°C and 60%RH, long-term storage at -18°C;
SC2 – Provide details on the type of containers and the packaging procedures (and the corresponding equipment, if any) that you use.
Active collection: paper bags
Base collection and safety duplicates: laminated aluminum foil bags

SC3 - What is the range of seed moisture contents (smc) of your stored seeds of different species; what measures do you apply to keep and/or monitor the (low) moisture level? Do you treat different species differently?
<8% for all species (5-6 % for cereals and 7.5% for some species like carrots and beans)

SC4- Provide data on the total storage capacity (number of containers, number of accessions) and an estimated percentage to which extent this capacity has been filled.
Total storage capacity for 15000 accessions, 70% is filled.

SC4 – Please include any other aspects regarding storage conditions at your genebank that you regard as important (e.g. anticipated lifespan of freezing and drying equipment and related prudent financial management).
Carefully planning of equipment acquisition and if necessary replacement of equipment.

A. In vitro Culture Collections

Box 3.1.1.B Initial viability
IV1 - Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your plant material, in particular during culture of donor plants (e.g. cultivation practices [field, greenhouse], phytosanitary pre-treatments, like use of pesticides).
Plant protection measures are being performed to prevent diseases.
IV2 – Describe procedures of explant isolation (organ source in the plant, manipulations) and sterilization (chemical and handling) of the explants.
Potatoes: organ source: vigorous sprouts, size appr. 1 cm. completely cut, transferred to sodium hypochlorite (5%) for 30 sec, 2x washed with distilled water for 30 sec each, transferred to Murashige & Skoog medium.

IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial viability.
As source for explants only healthy material is used. Upon virus detection by ELISA (six common viruses), a thermotherapy process is initialized, followed by meristems extraction.

Box 3.1.2 .B Viability Monitoring
VM1 - Describe the routine in vitro viability monitoring system that you use.
(*The monitoring system should include the following aspects:*
a) *regular control of contamination events,*
b) *control of hyper-hydricity,*
c) control of health state (if different from a above),
d) *etc*).
In vitro viability monitoring is performed regularly during transfer from one subculture to the other. Furthermore, control checks are conducted in the warm culture rooms every second week and in the cold rooms monthly. These checks cover visual controls on fungal or bacterial contamination. Hyperhydricity is excluded during transfers between the subcultures.

VM2 - Describe the information "system" (i.e. an "expert system") that you might have in place that allows you to make more species or even accession-specific decisions when the next monitoring should take place.
No specific system implemented. Experience and skill of the technical staff is crucial for special decision.

VM3 - Please provide information on non-specific thresholds that you might use for vigor of in vitro cultures (i. e. multiplication rates, loss by weak growth) and for the amount of culture vessels (tubes, jars) left of an accession to initiate additional multiplication measures?
Decisions on the cultivation temperature and multiplication regimes are taken according to the personal experience of the responsible staff members.
Decisions are made accession-specific and will be recorded in the running laboratory protocols. They cannot be published as standardized recommendations.

Box 3.1.3.B Storage Conditions (for the different types of collections i.e. short/medium- or long-term storage)
SC1 - Please provide details on light, temperature and relative humidity conditions of your culture and storage rooms, as applicable. In case they vary from room to room, please provide details for each.

Potatoes: standard in vitro culture room: 20°C, 16h light, 70% humidity; Induction of microtuber formation:10°C, 10h light, 80%humidity, microtuber storage: 4%, no light, 80% humidity.

SC2 – Provide details on the type of cultivation vessels (tubes, jars plastic vessels etc.) and the transfer procedures (including the corresponding equipment, if any) that you use. Potatoes: cultivation vessels: glass tubes, inner diameter 1,6 cm , length 15,6 cm; scissors, forceps, scalpel, heat sterilizer (250 °C), Bunsen burner, glass cutting plate, sterile bench, alcohol.

SC3 – Please include any other aspects regarding in vitro culture and storage conditions at your genebank that you regard as important.
No other information available.

B. Cryopreserved Collections

ACW doesn't have cryopreserved collections.

Box 3.1.1.C Initial viability

IV1 - Describe the procedures or practices that you have in place to ensure the highest possible initial viability of your cryopreservation explant (source: in vitro pre-culture or directly from in situ explants), sterilization and explant isolation.

IV2 – Please provide any other information on procedures that you follow to ensure highest possible initial viability (e.g. elimination of virus diseases).

Box 3.1.2.C Viability Monitoring

VM1 – Please indicate whether (and if so when and how) you perform random viability tests after the initial viability test? [see also VM3 below]

VM2 - Please describe the information "system" that you might have in place that allows you to make more species or even accession-specific decisions.

VM3 – Indicate for the initial regeneration control,

a. what is the percentage of regenerated control explants relative to the total number of explants per accession;
b. any thresholds that you use [e.g. discard the material as not storable below a certain regeneration rate of the control],
c. whether you apply different procedures for accessions with erratic regeneration rates of the control [e.g. increase the amount of explants stored]; etc. and
d. what is the threshold what is the threshold number of remaining explants of a given accession under which you initiate regeneration for multiplication?

Box 3.1.3.C Storage Conditions (for the different types of collections i.e. short/medium- or long-term storage)

SC1 - Please provide information on the general system used for cryopreservation (liquid nitrogen or vapor phase, automatic tank filling or filling by hand). In case they vary from tank to tank, please provide details for each.

SC2 – Provide details on the type of cryopreservation tanks and storage system within the tank that you use.

SC3 - Do you treat different species differently?

SC4 – Please include any other aspects regarding storage conditions at your genebank that you regard as important.

C. Field Genebank Collections

Box 3.1.1.D Initial viability

IV1 - Describe the procedures or practices that you have in place to ensure the highest possible quality of your planting material, in particular during the growing from donor plants (e.g. cultivation practices in the field or greenhouse], phytosanitary pre-treatments, etc.).
Procedures and legal requirements are given for vegetatively maintained crops (procedures for fruit trees, vines, berries, potatoes and are available in French and German (http://www.cpc-skek.ch/deutsch/nap_projekte/konzepte_und_richtlinien.html and after 2014 on www.bdn.ch).

IV2 – Describe any particular procedures you use (e.g. which organ of the donor plant you use to reproduce the planting material).
No particular procedures

IV3 – Please provide any other information on procedures that you follow to ensure highest possible initial quality.
Visual control by trained persons before material is taken.

Box 3.1.2 .D Viability Monitoring

VM1 - Describe the routine field genebank monitoring system that you use.
(*The monitoring system could include the following aspects: regular control of disease or pest contamination, other types of damages to the plants, etc*).
Annual control by independent institutes for quarantine pests, plant health is checked frequently during growing season by permanent staff; pest control measures are taken according to good agricultural practice

VM2 - Describe the information "system" that you might have in place that allows you to make more species or even accession-specific decisions when the next monitoring should take place.
Monitoring takes place frequently during growing season by permanent staff. Data are included in the genebank information system (www.bdn.ch).

VM3 - Please provide information on non-specific thresholds that you might use for the quality of the individual plants (e.g. loss by weak growth) and for the amount of plants of an accession left in the field before additional initiating multiplication measures?

Box 3.1.3.D Maintenance Conditions

SC1 - Please provide details on your cultural practices (e.g. cultivation practices; pruning; irrigation; protection against animals etc.; pest and disease management; etc. applied to your field genebank material. Cultivation and pest/disease management according to good agricultural practice (well trained staff); specialists for pest and disease control available;
no irrigation; fences against wild deer. Specific information is available in French and German: http://www.cpc-skek.ch and after 2014 on www.bdn.ch .

SC2 – In the case of annual or sub-perennial species that cannot over-winter in the field genebank, what measures do you take?

SC3 – Please include any other aspects regarding field genebank maintenance conditions at your genebank that you regard as important.

3.2 Maintaining Genetic Integrity

Maintaining the genetic integrity of an accession can be achieved by minimizing genetic drift which may occur predominantly during the process of regeneration, due to too small numbers of individuals being planted, sub-optimal pollination and/or the introgression of alleles from other accessions or commercial crops or crop wild relatives. The following aspects are important and for achieving the

objectives of maintaining genetic integrity and should be briefly described. Please note that a distinction should be made between seed numbers for an accession and seed numbers for sub-samples per accession. The latter only applies if the seeds of a given accession are being stored and distributed as sub-samples. As genetically modified materials get more widely distributed and as it might have specific (legal, technical, administrative) requirements a separate box on this type of material is included.

For in vitro cultured and cryopreserved material, which are normally maintained as clones, genetic stability is as important as genetic integrity of the seed-stored material.

Navigation Box on Maintaining Genetic Integrity section

Seed – If applicable, please complete the section on Genetic Integrity for the activities related to seed genebanks (i.e. boxes 3.2.1.A – 3.2.5.A)

In vitro cultures – If applicable, please complete the section on Genetic Integrity for the activities related to in vitro culture (i.e. boxes 3.2.1.B – 3.2.3.B

Cryopreservation – If applicable, please complete the section on Genetic Integrity for the activities related to cryopreserved collections (i.e. boxes 3.2.1.C – 3.2.3.C)

Field genebanks – If applicable, please complete the section on Genetic Integrity for the activities related to field genebanks (i.e. boxes 3.2.1.D – 3.2.3.D

A. Seed Collections

Box 3.2.1.A Seed Containers and Sample Size

SCSS1 – Do you document the initial number of seeds of individual accessions (either as received from collecting missions or through exchange)?
Yes, weight of sample or number of seeds.

SCSS2 – Please describe what kind of containers (and equipment) you use, the procedure you follow with respect to sub-sampling, seed numbers per container, etc.
Seed storage containers: paper bags and aluminum foil bags (see above); number of seeds per container ist not fixed, but is indicated in a database.

SCSS3 - What is the number of seeds that you use as the minimum threshold per accession? Are these seed numbers of a given accession based on genetic parameters (such as reproduction biology; heterogeneous samples)? Please provide URL of your protocols if these are on-line available
Species (accession) specific thresholds (amount of at least 2 generation cycles in our medium-storage) depending on reproduction biology, heterogeneity of accession and biostatus: (Cereal : 60- 100 g in the medium-term collection; other cultures: 1000 seeds).

SCSS4 – Please provide details on other aspects that are important in this context.

Box 3.2.2.A Pollination Control

PC1 - Please describe the regeneration procedures that you follow for self- and outbreeding species.

(*Please include in your description the following aspects:*

a. *Any control measures to minimize or avoid cross pollination between accessions;*
   Crop specific distance (wind pollinated cross pollinators > 300m, avoiding downstream planting in major wind direction) and isolation methods
b. *The use of pollination cages for insect pollinated species;*
   No
c. *The use of specific pollinators for insect pollinated species;*

No

d. *Strategies to ensure that males and females participate equally in the reproduction*).
No strategy

e. *Strategies to avoid any genetic drift (minimum number of plants, minimum number of plants at flowering stage before pollinators introduction, similar quantity of seeds harvested from each plant, etc.)*
For outbreeding species the number of individual is kept as large as possible (normally about 40-50 plants).

PC2 – Provide any other relevant information on procedures that you apply to control pollination of your germplasm.

Box 3.2.3.A Regeneration Environment and Procedures

RE1 – Describe the regeneration environment and conditions that you apply. If applicable, you might want to distinguish between different types of germplasm (e.g. wild relatives, landraces, modern varieties, breeding material, genetic stocks, etc.).
(*Consider the following aspects:*

a) *In how far are the environmental conditions of the current regeneration of individual germplasm accessions comparable to the environmental conditions that existed at the original collecting or breeding site?;*
Normal standard field conditions and standard green-house conditions for regeneration, no special environmental conditions are created.

b) *Do you use controlled environments?;* Greenhouse for producing seedlings

c) *Do you collaborate with other genebanks in Europe?;* No explicit collaborations

d) *others*).

RE2 – Please include any other relevant points on regeneration environment.

Box 3.2.4.A Seed Processing Procedures

SPP1 – Describe the protocol(s) that you use for threshing and seed cleaning.
Standard threshing and cleaning by machines and by hand.

SPP2 – Describe the protocol(s) that you use for seed drying, including whether you use different drying procedures for different types of species.
Drying of cleaned seeds at 23°C, 10-15%RH (around 10 days for all species) to achieve seed moisture content around 5-6%.

SPP3 – Please describe how you keep the time between harvesting and the actual (long-term) storage of seeds as short as possible.
We engage every year back staff for harvesting and threshing (normally 1 person for 3 to 4 month).

SPP4 – Please describe how and where you store (in a temporary manner) newly harvested seeds.
(Please provide details on the temperature and relative humidity of the storage room/space; what type of containers do you use, if any).
Drying chamber (2-3 days at 23°C), after drying at room temperature and ambient humidity in a good aerated room in attending to be threshed.

SPP5 – Describe the criteria you use to decide on seed quantity per accession for the long-term storage.
4 generation cycles and for large seed species as much as possible (2000 – 5000 seeds).

Box 3.2.5.A Genetically Modified Material

GMM1 – In case you treat GMO material differently from "normal germplasm", please provide here the details for each of the deviating procedures (and equipment).
No known GMOs in the genebank

GMM2 – Describe the policy and procedures (if any) in your genebank, related to ensuring that distributed samples are not containing GMOs.

B. In vitro Culture Collections

Box 3.2.1.B In vitro Culture Vessels and Sample Size

SCSS1 – Indicate if you document the initial number of explants of individual accessions when culture is initiated (from one or from more clonal donor plants)?
The number of initial explants is one: several explants are generated at first (numbers vary according to accession), these are multiplied, identity conformity is assessed in the greenhouse and one clone is selected to proceed with conservation and sanitizing.

SCSS2 – Please describe in general terms the type of culture vessels (as far not already done in section SC2 in Box 3.1.3.B), media and phytohormones you use as well as the procedures you follow with respect to cutting technique, callus exclusion, etc.
Medium is usually based on Murashige and Skoog's (1962) formulation.

SCSS3 – Please indicate whether or not you use a minimum number of in vitro plantlets per accession?
The minimum number of in vitro plantlets per accession is 4.
However, duplicate conservation in small Petridishes at 4°C or as microtubers or as microbeads is generalized for most accessions.

SCSS4 – Please provide details on other aspects that are important in this context.
The in vitro production of potato microtubers is carried out through several stages: at first microplant growth, then initiation of stolon followed by tuber formation (or tuberization). During the last stage, it is possible to develop high quality microtubers in terms of weight and size. However, after examination, the quality of plant material produced in vitro is so far better when the duration of tuberization is extended to over 16 weeks culture.
And the accessions are genotyped by microsatellite analysis shortly after installation and usually repeated before delivering samples.

Box 3.2.2.B In vitro Culture Procedures

SPP1 – Describe the numbers of sub-clones you may cultivate per accession (assuming that this is not crop specific)
No clones

SPP2 – Describe the sub-culture duration (if not crop specific)
Potatoes: 4 to 6 weeks

SPP3 – Describe the criteria you use to decide on in vitro plant quality (if not crop specific).
Potatoes: No bacteria/fungi/callus formation, healthy looking and test ELISA, 6 common potato viruses.

Box 3.2.3.B Genetically Modified Material

GMM1 – In case you treat GMO material differently from "normal germplasm", please provide here the details for each of the deviating procedures (and equipment).
No known GMOs in the genebank

C. Cryopreserved Collections

Box 3.2.1.C Cryopreservation Containers and Sample Size

SCSS1 – Indicate if you document the initial number of explants of individual accessions?
No cryopreservation in our genebank.

SCSS2 – Please describe what kind of cryopreservation vessels (and equipment) you use (only if they differ from the corresponding answers in previous boxes), the procedure you

follow with respect to separate material containing viruses or bacteria from healthy material

SCSS3 - What is the number of explants that you use as the minimum threshold per accession?

SCSS4 – Please provide details on other aspects that are important in this context.

Box 3.2.2.C Cryopreservation Procedures (as long as not crop specific)
SPP1 – Describe the protocol(s) that you use for preculture and pretreatment such as cold acclimation and dehydration.

SPP2 – Describe the protocol(s) that you use for cryopreservation proper (such as slow freezing, droplet freezing, vitrification, encapsulation etc.)

SPP3 – Describe the protocols that you use for regeneration (slow or fast rewarming, washing, dark periods etc.)

SPP4 – Describe the time span and method(s) of survival and regeneration controls

SPP5 – Describe the criteria you use to decide on explant quantity per accession for the long-term storage.

Box 3.2.3.C Genetically Modified Material
GMM1 – In case you treat GMO material differently from "normal germplasm", please provide here the details for each of the deviating procedures (and equipment).
No known GMO material in our genebank.

D. Field Genebank Collections

Box 3.2.1.D Accession Sample Size
SCSS1 – Indicate if you document the initial number of plants of individual accessions (either as received from collecting missions or through exchange)?
Initial number of plants is documented (available in German and French): (http://www.cpc-skek.ch/deutsch/nap_projekte/konzepte_und_richtlinien.html).
SCSS2 – Please describe what kind of procedures you follow, if any, with respect to subsampling and subsequent place/container/etc. of maintenance?
none

SCSS3 - What is the number of plants that you use as the minimum threshold per accession? Are these plant numbers of a given accession based on genetic parameters (such as reproduction biology; heterogeneous samples)?
The number of plants according to the different crops is documented in German and French: (http://www.cpc-skek.ch/deutsch/nap_projekte/konzepte_und_richtlinien.html) :
5 – 12 plants of vines,
3 plants of black and red currant, raspberries and gooseberries,
10 plants of strawberries.

SCSS4 – Please provide details on other aspects that are important in this context.

Box 3.2.2.D Multiplication
PC1 - Please describe the multiplication procedures that you follow for your field genebank material (both, annual as well as perennial species)?
(*Please include in your description the following aspects if they would apply to your field genebank management procedures): :*

a. Any control measures to minimize or avoid cross pollination between accessions (if

applicable/relevant);
not relevant for small fruits (current, including strawberries, raspberries, gooseberries) and vines (primarily self-pollinating species and propagated vegetatively).

b. *The use of pollination cages for insect pollinated species;*
not relevant: see a)

c. *The use of specific pollinators for insect pollinated species;*
not relevant for vine and small fruits (see a)

d. *Strategies to ensure that males and females participate equally in the reproduction*).
not relevant

e. *Strategies to avoid any genetic drift (minimum number of plants, minimum number of plants at flowering stage before pollinators introduction, similar quantity of seeds harvested from each plant, etc.)*
not relevant

PC2 – Provide any other relevant information on procedures that you apply to control pollination of your germplasm in case of harvesting planting material from your field genebank material?

Box 3.2.3.D Planting Material Processing Procedures

SPP1 – Describe the protocol(s) that you use for threshing and seed cleaning, if used as an intermediate step for the management/multiplication of your field genebank accessions.
not relevant

SPP2 – Please describe how and where you store (in a temporary manner) newly harvested planting material.
(Please provide details on the temperature and relative humidity of the storage room/space; what type of containers do you use, if any, etc.).
Cold storage at 4°C (cuttings).

SPP3 – Describe the criteria you use to decide on the number of plants per accession intended for the long-term conservation.
The criteria to define the number of accession:
- as much as possible
- we looked for the balance between available place, enough plants for evaluation and characterization, charges and security.

3.3 Ensuring Availability

An important objective of conservation efforts is to facilitate the effective utilization of germplasm accessions by researchers, breeders and farmers. Thus, ensuring the ready availability of stored germplasm is an important principle. It refers to the ability of genebanks to supply and distribute the stored germplasm, together with any associated information, in an adequate way to users. Aspects that can affect the availability include: (a) policies, (b) seed stock, (c) health status of accessions, and (d) distribution quantity. Although most of the questions are not relevant in the ECPGR/AEGIS context, it was decided to keep the questions and to allow for a comprehensive genebank manual that can be used “globally”.

Navigation Box on Ensuring Availability

Seed – If applicable, please complete the section on Ensuring Availability for the activities related to seed genebanks (i.e. boxes 3.3.1.A – 3.3.4.A)

In vitro cultures – If applicable, please complete the section on Ensuring Availability for the activities related to in vitro culture (i.e. boxes 3.3.1.B – 3.3.4.B

Cryopreservation – If applicable, please complete the section on Ensuring Availability for the activities related to cryopreserved collections (i.e. boxes 3.3.1.C – 3.3.4.C)

Field genebanks – If applicable, please complete the section on Ensuring Availability for the activities related to field genebanks (i.e.boxes 3.3.1.D – 3.3.4.D

A. Seed Collections

Box 3.3.1.A Ensuring Availability of Germplasm – Policy Aspects

AGP1 – Describe the germplasm distribution policy that you follow at your genebank.
(*You might want to consider in your response the following aspects:*
a) *crop/species specificity;*
b) *whether or not sufficient seed stock is available; who the requestor is;*
c) *what the purpose of the germplasm request is;*
d) *any restrictive conditions and/or*
e) *the total amount of accessions sent per request for distribution of germplasm;*
f) *use of a formal agreement to distribute the germplasm*).
Normally all requests are processed based on SMTA (exception: direct use, for example farmers who receives the material without any procedure).
Normally for cereals 100 seeds are shipped, for vegetable 30 to 50 seeds. In specific cases (e.g. research projects) more seeds will be available based on case by case decisions.

AGP2 - Do you have as part of your service rendering policy aspects such as a "maximum time" between receiving a germplasm request and distribution of the germplasm?
Handling time is max. 3 weeks after receiving the request.

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.
Information is given on request, passport and description data are available on www.bdn.ch (mentioned in the accompanying letter).

Box 3.3.2.A Ensuring Availability of Germplasm – Seed/Germplasm Stock Aspects

AGSS1 - Please provide details on the minimum/maximum amount of seed, plant, in vitro samples that you distribute (where relevant, differentiated by species groups, i.e. self-pollinating, cross-pollinating and/or whether an accession is homo- or heterogeneous).
Crop specific; normally 30-50 for self-pollinating, 100 seeds for cross-pollinating vegetables, 100 seeds for cereals.

AGSS2 – Describe how you store the seeds/etc. of a given accession with respect to the use of single or multiple bags or containers per accession.
Each harvest from a given accession will be placed in a different bag/container and documented accordingly.

AGSS3 – Describe how you manage the availability of adequate seed/etc. stock per accession, including the use of an absolute lower minimum of seeds per accession as the threshold to decide to regenerate.
The available amount of seed and the corresponding germination data can be retrieved for each accession from the genebank information system. The absolute lowest minimum is the amount of seeds necessary for two sowings.

AGSS4 – Provide here information on any other aspects that are relevant to manage seed/etc. stocks.

Box 3.3.3.A Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you store seed/other germplasm with respect to germplasm health considerations, including whether you have a "policy" of storing only "disease free" (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.
No crop specific tests. Potatoes: only seed transmitted diseases are tested.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).
Outside EU: phytosanitary certificate.

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".
Outside EU: phytosanitary certificate.

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

Box 3.3.4.A Germplasm Supply
GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes, including whether you differentiate between germplasm from self- or outbreeding species, heterogeneous accessions, and possibly other aspects.
If we have enough seed:
Selfbreeding crops 30-50 seeds
Outbreeding and heterogeneous crops/accessions around 100 seeds
GS2 – As GS1 above, but in case your germplasm samples do not possess the minimum viability, would you increase the number of seeds?
Yes, if we have enough seeds.
GS3 – Please provide information on any other aspects related to seed supply.

B. In vitro Culture Collections

Box 3.3.1.B Ensuring Availability of Germplasm – Policy Aspects
AGP1 – Describe the germplasm distribution policy that you follow at your genebank.
(*You might want to consider in your response the following aspects: is the user informed about the option to get provided with in vitro cultures and whether they are available all the time of the year, are in vitro samples an option or the only way to get material; who the requestor is; what the purpose of the germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm)*

AGP2 – Indicate if you have as part of your service rendering policy aspects such as a "regular or a maximum time" between receiving a germplasm request and distribution of the germplasm?
Due to maintenance cycle requirements no time period fixable

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.
Acc. name and number. More information and descriptions are available on www.bdn.ch.

Box 3.3.2.B Ensuring Availability of Germplasm – Germplasm Stock Aspects
AGSS1 - Please provide details on the maximum amount of in vitro samples that you distribute.
no distinct limits fixed, but usually 2-10 plantlets per accession, upon demand, larger amounts can also be made available.

AGSS2 – Describe how you store the samples of a given accession with respect to the use of vessels for culture and vessels for distributions (glasses of plastic bags).
Most cultures in cultures tubes and distribution in the same vessels. Upon request, potatoes

can be distributed as microtubers.

AGSS3 – Describe how you manage the availability of adequate plants per accession, including the use of an absolute lowest minimum of plants per accession as the threshold to decide to regenerate.
For accessions conserved dynamically 2 x 4 plants (in different growing chambers/incubators) for plants which can be conserved at 4°C, 2 x 4 plants in two different cold-rooms complete the plants conserved dynamically.

AGSS4 – Provide here information on any other aspects that are relevant to manage stocks (e.g. transfer of material through greenhouse transfer phases in case a user cannot handle in vitro cultures).
If explicitly requested, transfer of material to greenhouse is possible and vegetative clones are then offered.

Box 3.3.3.B Ensuring Availability of Germplasm – Health Aspects
AGHA1 – Describe how you store germplasm with respect to germplasm health considerations, including whether you have a "policy" of storing only "disease free" (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.
Potatoes: iv material tested for six viruses (PLRV, PVA; PVM; PVS; PVX; PVY) internally and virus removed by heat treatment; at least after iv establishment and before distribution/transfer to greenhouse/field Others: No further policy is followed on disease-free material.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).
Within EU provision of plant passports (potatoes only), phytosanitary certificate for outside EU provision (valid health tests and mostly import permits required), bacterial, fungal, phytoplasm and extra viral tests according to recipient country regulations.

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".
SEE AGHA2

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.
Bacteriology and virology group procedures applied.

Box 3.3.4.B Germplasm Supply
GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes.
Usually 2-10 plantlets per accession, depending on delays.

GS2 – Please provide details of your routine methodology of containers etc. that you use to distribute in vitro cultures.
Standard cultivation in glass tubes, alginate coated microbeads for several species or, for potatoes, microtubers.

GS3 – Please provide information on any other aspects related to in vitro plant supply.
If possible, not shipped in periods of frost; express delivery for remote countries, even within Europe (periods without light as short as possible).

C. Cryopreserved Collections

Box 3.3.1.C Ensuring Availability of Germplasm – Policy Aspects

AGP1 – Describe the germplasm distribution policy that you follow at your genebank.
(*Cryopreserved material is for distribution in exclusive cases only – e.g. for special research, please describe your policy*; *who the requestor is; what the purpose of the germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm*).

AGP2 – Indicate if you have as part of your service rendering policy aspects such as a "regular or maximum time" between receiving a germplasm request and distribution of the germplasm?

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.

Box 3.3.2.C Ensuring Availability of Germplasm – Germplasm Stock Aspects
AGSS1 - Please provide details on samples that you distribute (where relevant).

AGSS2 – Describe how you store, for distribution, the cryopreserved material of a given accession with respect to the use special equipment such as dry-shippers etc.

AGSS3 – Describe how you manage the availability of adequate cryopreserved material.

AGSS4 – Provide here information on any other aspects that are relevant to manage seed/etc. stocks.

Box 3.3.3.C Ensuring Availability of Germplasm – Health Aspects
AGHA1 – Describe how you store seed/other germplasm with respect to germplasm health considerations, including whether you have a "policy" of storing only "disease free" (as far as you can see or determine) accessions, at least for the quarantine pests and diseases. You could also add data on separation of differently infested material in separate cryotanks etc.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

Box 3.3..C4 Germplasm Supply
GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes.

GS2 – Please provide details of your routine methodology of containers etc. that you use to distribute cryopreserved material.

GS3 – Please provide information on any other aspects related to cryopreserved material supply.

D. Field Genebank Collections

Box 3.3.1.D Ensuring Availability of Germplasm – Policy Aspects
AGP1 – Describe the germplasm distribution policy that you follow at your genebank.
(*You might want to consider in your response the following aspects: crop/species specificity; whether or not sufficient seed stock is available; who the requestor is; what the purpose of the*

germplasm request is; any restrictive conditions and/or the total amount of accessions sent per request for distribution of germplasm; use of a formal agreement to distribute the germplasm).

AGP2 – Indicate if you have as part of your service rendering policy aspects such as a "maximum time" between receiving a germplasm request and distribution of the germplasm?
Vine, small fruits: depends on the season, normally only in wintertime (seasonal).

AGP3 – Describe how you treat "related information" about the requested accessions that you make available to the requestor, i.e. provide details on the typical information you send out with the germplasm.
Acc. name and number. More information and descriptions of the accessions are available on www.bdn.ch.

Box 3.3.2.D Ensuring Availability of Germplasm – Seed/Germplasm Stock Aspects

AGSS1 - Please provide details on the minimum/maximum amount of plants or organs (cuttings, bulbs, tubers, etc.) per plant that you distribute per accession (where relevant, differentiated by species groups, i.e. annual or perennial; woody or herbaceous; other) and/or whether an accession is clonally or sexually propagated).
Normally 3-5 cuttings (vine, fruit trees, berries), depending on availability.

AGSS2 – Describe how you manage the availability of adequate organs per accession, including the use of an absolute lower minimum of plants per accession as the threshold to decide to multiply.
Grape vines and small fruits (Rapberries and Goosberiies are maintained permanently in the field).

AGSS3 – Provide here information on any other aspects that are relevant to manage plant material stocks.

Box 3.3.3.D Ensuring Availability of Germplasm – Health Aspects

AGHA1 – Describe how you maintain field genebank (and any intermediate storage step) accessions with respect to health considerations, including whether you have a "policy" on accepting/planting only "disease free" planting material (as far as you can see or determine) accessions, at least for the quarantine pests and diseases.
Annual visual control and tests for quarantine diseases in case of suspicion by responsible authorities.

AGHA2 – Describe how you follow plant quarantine rules and regulations when exporting germplasm abroad (especially to countries at another continent).
Outside of EU, the material is accompanied by a phytosanitary certificate.

AGHA3 – Describe if and how you distribute germplasm accompanied by a phytosanitary certificate or a "plant passport".
see AGHA2

AGHA4 – Provide any other relevant information on procedures that you follow with respect to germplasm health aspects.

Box 3.3.4.D Germplasm Supply

GS1 – Describe the policy of your genebank with respect to the sample size that you use for distribution purposes, including whether you differentiate between germplasm from annual or perennial species, clonally or sexually propagated accessions, and possibly other aspects.
3 to 5 cuttings.

GS2 – Please provide information on any other aspects related to seed supply.
Only if sufficient seeds are available

4 Providing Information

The lack of adequate information on a given accession may well decrease the value of that accession to the user. The information on individual accessions should be as complete as possible in order to facilitate the identification of duplicates and/or to select accessions with desirable characteristics. A genebank should have a documentation system in place that allows to optimize management of the collections as well as to provide access to information about the collection to users.

Box 4.1 Genebank Documentation System

GD1 - Please provide details on the technical aspects of the genebank information management system(s) that you use.

a) On which software is the system based (i.e. Oracle, Fox Pro, MS Access, MS excel, MS Word, other?).

Django Web application backed by a MySQL database.

b) In case you use a manual information management system, please provide details.
c) In case your "internal" database(s) is/are different from the publicly available database(s), please provide details on both,
d) Describe which activities of the genebank are covered by the system.

In Switzerland all data on conservation (www.cpc-skek.ch) and evaluation of genetic resources are available on Internet (www.bdn.ch).

GD2 - Provide details on which types of data you handle in your documentation system, e.g. passport data, characterization & evaluation data, cultivar data, material distribution etc.

Passport data, botanical names (taxonomy), seed storage data, characterization and evaluation data.

GD3 - In case your internal database(s) is/are different from the publicly available database(s), please provide details on both.

GD4 – Describe in which form you send accession specific data (e.g. as hard copy, electronically – if the latter, please specify (in plain text) which file format, i.e. Excel, Access, others is used).

Data are available on Internet and if requested, data can be provided as Excel or CSV file.

GD5 - Provide information on how technical support for development and maintenance of the documentation system is arranged

We have an annual budget for technical support and future development of the database.

GD6 – Describe your genebank policy with respect to backing-up of the database contents, including with which frequency?

Regularly back-up system.

GD7 – Provide any other information on your information management system that is not covered in one of the above questions.

Box 4.2 Information Exchange

IE1 – Please describe how you make your passport data available to users (i.e. as hard copy; via the internet; other?).

Internet, Excel or CSV file if requested

IE2 - Please indicate if your data is available as machine to machine web-services. In case it is, describe

a. what types of data (passport data, characterization & evaluation data etc) and
b. which web-service interfaces are available (i.e. GBIF IPT, BioCase, TapirLink).

All data are available in our internet database. No web services currently.

IE3 - Please indicate if your data is published to EURISCO. Describe which data is published to EURISCO and at which intervals.

Our data are published to EURISCO and updated annually. Last update in July 2012.

IE4 – Please provide any other information on information exchange that is important for others to know.

IE5 - Describe the kind of information you distribute together with the germplasm to persons that request germplasm?

(*Please consider the following data types: Passport, Characterization; Evaluation, and/or Germplasm management data (e.g. viability percentage; protocols*

followed for routine operations; etc.).
Accession number and accession name and reference where more specific information can be found (www.bdn.ch).