

Project report of the AEGIS *Brassica* subgroup

Noor Bas, Gert Poulsen and Eduardo Rosa

4.1. Propose models for the European Genebank Integration System; define the purpose and the scope of the system, in relation to conservation, availability and use of the material. Reconsider the old base collection concept of FAO/IBPGR, analyze the reasons for non-acceptance in the past, understand why it did not succeed and verify whether any positive elements of the concept could be re-proposed.

- On a crop-by-crop basis (centralized)
- On an accession basis (decentralized)
- Sub-regional basis

The model

The pros and cons of each model have been outlined by Lorenzo Maggioni in the presentation: “Sharing of responsibilities for conservation in Europe” in the AEGIS start-up meeting.

A decentralized system has been selected by the project partners with the following reasons:

- Within the region, the use of the numerous *Brassica* ssp. and cultivar groups is very diverse. Between countries, breeding purposes are often different and focused on different cultivar groups, in spite of the internationalization of breeding companies. Therefore, in this model, utilisation of *Brassica* PGR can be stimulated in the same way as in the present situation.
- It enables the best environment and scientific conditions for conservation
- Local knowledge of the different *Brassica* ssp and cultivar groups has to be conserved.

As a consequence, in this system accessions must not only be conserved but also be freely available for users, in line with the International Treaty.

The old base collection concept

Observations on this concept have been outlined in the presentation by Jan Engels and Imke Thormann: “IBPGR Global Register of Base Collections of Food Crops”

From this information the *Brassica* subgroup concludes that in a new model the following should be clear.

Link between base and active collections

The AEGIS Crop collection should consist of AEGIS accessions which are maintained both for long-term conservation and for use (by collection holders and international user community). This close link between conservation and use has also been stated in agreements for the register of base collections, but has often not been implemented. As a consequence the terminology of base and active collections has become confusing and might better not be used for AEGIS collections.

It is therefore suggested that the terminology of base and active collections should be abolished and that for each AEGIS accession a base sample (or long-term conservation sample) and an active sample (or user sample) must be maintained.

The responsibilities of “AEGIS” accession holders, stated in an AEGIS-agreement

The responsibilities of genebanks are similar as those stated in the agreements for the Register of base collections:

- Each collection holder selects and offers accessions to AEGIS.
 1. The “AEGIS” accessions-holder has the responsibility to maintain the “AEGIS” accessions for an indefinite period of time
 2. The “AEGIS” accessions-holder has the responsibility to make “AEGIS” accessions continuously available for *bona fide* users.
 3. The “AEGIS” accessions-holder has the obligation that, whenever previous is not possible any more, the “AEGIS” accessions-holder notifies a “central, authorised body” to make sure that these accessions are transferred to another collection holder who is partner in AEGIS.
 4. The “AEGIS” accessions-holder has the obligation to maintain the “AEGIS” accessions according to quality standards jointly defined by the AEGIS partners. These must be monitored by a quality system. (see recommendations in 4.5)
 5. The “AEGIS” accessions-holder has the obligation to provide all data (passport/characterisation/evaluation) of the “AEGIS” accessions to the “AEGIS” –*Brassica* database

National responsibilities

These have not been addressed in the agreements for the register of base collections, but must be included.

National and subregional (NGB and SEEDNET) governments and authorities are, directly or indirectly in the present situation, (partly) financing genetic resources.

This financing is irrespective of the status of the genetic resources maintained in the different countries, which varies between countries. The status of the financing is often not clear and has also not been clear in the pre CBD period.

To assure the continuity in the maintenance of AEGIS collections, ideally member countries should express their commitment, not only to use their sovereign rights but also to continuously ensure the necessary funds to maintain AEGIS accessions according to as stated in an AEGIS agreement.

Relationship with the user community

The relationship between AEGIS and the user community should be better defined and also close in the establishment and implementation of the system for the following reasons.

- Users are necessary for cooperation in characterization/evaluation/regeneration activities
- Combining AEGIS and users, in an Agricultural Platform could strengthen the competitiveness of Europe
- Especially breeding companies could use their economic power to lobby on national and EU level for making available funds to conserve AEGIS accessions.

The group can only hope that in the future governments/authorities, realising they are financing “AEGIS” accessions, will conclude this is an EU responsibility and therefore will lobby for EU financing.

4.2. Propose suitable organizational structures and institutional relationships for these models and discuss the pros and cons of the different models, taking into account the relationship between long-term and working collections as they relate to the proposed models.

As the decentralized model has been selected by the *Brassica* partners, they propose the following, based on the ECP/GR working group

Organizational structures:

- Within the ECP/GR Working Group the establishment of “ a central authorized body”
 - which decides on the inclusion or rejection of “offered” accessions into “AEGIS“ according to the MAA concept, outlined in 4.4
 - which guard the monitoring of the quality of participating institutions.
 - Which includes (some tasks can be combined)
 - *Brassica* database manager
 - a coordinator of regeneration
 - a coordinator of characterisation
 - a coordinator of evaluation
 - a coordinator of safety-duplication
 - a representative of the user community

- An advisory *Brassica* group which gives information and recommendations to the “central authorized body”

The Working Group must get finance for meetings and activities.

Institutional relationships:

This issue has not been addressed in enough detail.

4.3. Identify legal elements to be considered when developing the System. Analysis of international and relevant national legal frameworks and of possible obstacles to be tackled for the creation of the System.

Some legal elements suggested by the project partners to be considered have been sent to the project manager.

All collection holders need to use a Standard Material Transfer Agreement (SMTA), but this is not regarded as a problem.

Other obstacles identified are: in the present situation the legal status of many collections are not clear and it is often not known if the national governments take responsibility for them. The *Brassica* subgroup has no knowledge how to tackle these and this is a responsibility for the policy “module” in the AEGIS project.

In CZE oilseed brassicas are in collections of private breeding companies, of which only passport data are donated and the accessions are not available for all users.

Some collection holders have difficulties to make available accessions of varieties which still fall under the variety protection. This issue should be addressed when developing AEGIS collections. Some genebanks have solved this problem by not including accessions which still fall under variety protection in their collections.

4.4. Analyze the concept of Most Original Samples and indicate the best way to identify the material to be included in the System, using the central databases as a tool. As a result, it should be possible to outline the extent of the problem of searching the existing collections and implementing a rational management system for conservation and use.

The Most Original Samples concept has been abandoned by the *Brassica* subgroup. More practical is to use the Most Appropriate Accession concept. Underlining the MAA concept is that only material maintained according to the quality and quantity standards suggested in 4.5 can be considered.

The following steps are recommended to identify the MAA:

First round:

1. Collection holders search their collection for candidate AEGIS accessions on basis of
 - a. Being part of the European core collection established during RESGEN project.
 - b. Material originating from their own country
 - c. If duplication of this material within a collection occurs, the most appropriate (most passport/characterization/evaluation data) accession is selected by the collection holder
2. Each country sends a list of candidate AEGIS accessions to the Working Group
3. The central authorized body checks the non-duplication of the offered accessions
4. Approval and assignment of the offered accessions as AEGIS accessions by Working Group

Second round:

5. Collection holders search their collections, if necessary with help from the database manager, for material from another origin of which is known not to have been included yet in AEGIS. Further steps from 1c – 4

Third round:

6. Collection holders search their collections for material of which valuable properties are known. Further steps: 2 and 4

These steps can be repeated when necessary.

In this way a European *Brassica* collection can evolve dynamically, i.e. accessions can be entered in (or deleted from) the collection.

It is recommended to start identifying MAA in the collections of *B. oleracea* and *B. napus*.

In relation to building the collection, discussions are necessary on what needs to be conserved: genotypes, genes or both.

4.5. Compile draft guidelines on the necessary scientific and technical standards to be met by the European Collections to ensure long-term conservation and easy access; define how these standards could be implemented.

As a preparation for discussions on standards during the ad hoc meeting of ECP/GR Working Group on *Brassica* in Prague 2006, a survey on different aspects of collection management has been carried out among collection holders of the countries represented at the *ad hoc Brassica* WG meeting. Information has been received by: CZE122, DEU146, DEU271, ESP004, ESP009, ESP026, ESP027, ESP169, FRA010, GBR006, ITA227, NLD037, POL096 (partly), PRT001, RUS001 and SWE002. The survey shows a great range of standards or usual operations used by the different collection holders, see for a summary table 1. These standards can be divided in:

1. Generic (institutional) standards: i.e. continuity, documentation, storage facilities and handling guidelines for seed material (for all crops), safety-duplication
2. Crop specific standards: i.e. minimum number of plants harvested, isolation etc.

The group made recommendations for minimum and recommended generic and crop specific standards for some procedures in collection management of AEGIS *Brassica* accessions, see table 1.

The group concluded that standards cannot be made for all procedures in collection management because of the diversity of climatic conditions in Europe and the facilities used. However written protocols, in English, should be available for all procedures in order to be able to control the quality.

The group did not see major constraints to meet the crop specific standards. However, from the survey it can be concluded that generic standards will cause constraints for some genebanks to be able to maintain AEGIS accessions. The following constraints have been identified and possible ways to implement the standards are suggested.

- Long-term storage facilities:
 - Required conditions (RUS)
 - monitoring conditions (CZE, ESP, ITA)
 - presence of alarm system, (CZE,ESP,FRA, ITA, PRT)
 - backup power unit and regular testing (ESP?, FRA, ITA)

For implementation funding is needed

- Documentation system:
 - Documenting viability (ESP?, ITA, RUS)
 - Documenting quantity (POL)
 - For linking data to a central database, web services are needed at all genebanks holding AEGIS accessions (all countries)

Implementation by money and by technical experts from ECP/GR documentation group

- Germination testing
 - Knowledge of seed physiology/seed testing experts is needed to establish a common protocol for seed testing and the minimum interval at which monitoring needs to take place, depending on initial germination. This knowledge is present in Europe in a fragmented way and need to be combined.

Implementation: establishment of a Working Group on Seed quality which gives input to establish standards and which can be consulted by genebanks. This will be necessary for all seed crops.

- Safety-duplication
 1. A large part of European collections is not or only partially safety-duplicated.
 2. For safety-duplication of many collections repackaging is needed.

Implementation: according to the overviews of safety-duplication in Europe of 2002 and January 2006 (see table 2) space is offered by several institutes for safety-duplication. Arrangements for safety-duplication should be made before accessions can enter AEGIS by signing a MOU by the collection holders offering and receiving the safety-duplicates. This is reported to a designated member of the Working Group, who coordinates if necessary.

- Quality control system
 - Protocols of management procedures need to be written in English (majority of genebanks)
 - An external quality control system will be used by only a few collection holders in the future
 - Continuity of all institutes holding AEGIS accessions needs to be secured
 - Quality control may be carried out by WG members. (yet to be decided if they must be trained for this and how to deal with the authority to control and in case of non-compliance)

Implementation: on institutional/national level decisions need to be taken first.

- A constraint identified through the survey is the existing confusion concerning the terminology of base/ active/working collections and regeneration/multiplication. The following terms are suggested:
 - Seed of an AEGIS accession is divided in a base sample (or long-term storage sample) and an active sample (or user sample)
 - Regeneration: the process of obtaining seed, no matter what the reason is. The term regeneration loses its previous connotation of only obtaining seed for the base collection.

Table 1. DRAFT Minimum and recommended standards in collection management procedures for cultivated species.

	Present practice	Minimum standards	Recommended standards
Passport data	No minimum – varying range	ACCENUMB ACCENAME GENUS SPECIES “cultivar group” ORCNTY DONOR SAMPSTAT	All EURISCO descriptors
Documentation of germination% in database	60% of collection holders	Yes	This information continuously to “EURISCO”
Documentation of seed quantity in database	90% of collection holders	Yes	This information continuously to “EURISCO”
Field doc +/- AEGIS		Yes	
Number of seeds base	Number of seeds for inclusion in collection: no minimum – 100.000 seeds	1000 for regeneration 1000 for germination	
Number of seeds active		3000, more dependant on species	13000
Number of seeds safety-duplication	Not asked in survey	500	2000
Number of seeds germination test	50 - 200	2 x 100	
Interval monitoring	2 – 30 years	Depending initial germination, ask experts	
Minimum initial germination	No minimum/ 60 – 90%	Depending on crop yet to be decided	90%
Criteria regeneration, quality	Low germination/ 50-85%	Germination < 65%	Germination < 75%
Criteria regeneration, quantity	500 – 3000 seeds	Seed active < 1000	
Number of plants in regeneration	20 - 100	30, less when individual harvesting	100, less when individual harvesting
Isolation	Cages/50 – 500 m	Cages or 800 m distance	
Checking identity	Morphologically by 30% of collection holders	Yes: 5 plants of 2 generations	Yes: 30 plants of 2 generations
DNA samples taken from accession	Not asked in survey		Yes
Moisture content seed base and active	3 – 10%	3-7%	3-7%

	Present practice	Minimum standards	Recommended standards
T° storage base samples	85%: ≤ -18°C	≤ -18°C	
T° storage active samples	Most: -5 - +5°C	≤ +4°C	-18°C
Monitoring and alarm system	Most monitor, 50% alarm system	Both: yes	
Backup power unit and regular check	70% have unit of which 60% test regularly	Both: yes	
Protocol of all collection management activities	33% yes, 33% in preparation, 33% no	Yes, in English	
Use of logbook for regeneration, monitoring conditions and checking	33% of collection holders	Yes	
Registration deviations from protocol in database	33% of collection holders	In non public field for management reasons	
Safety-duplication	10 – 100% of collections	In another location	In another country
Quality System	30% yes or developing or planned; 70% no	Yes, audited by ECP/GR WG	Certification
Hybrids?	From BrasEDB: included in most collections	Decisions to be made how to select them	
Avoiding contamination GMOs	Not asked in survey	Awaiting EU recommendations	

Table 2. Actual and offered capacity for safety-duplication (situation January 2006)

Institute	Storage conditions		Arranged	Institute keeping safety-duplicates	Offering to host
	T°C	RH			
IHAR POL	-18° C	not controlled	?		
CGN NLD0037	-20° C	not controlled	100% YES	HRI-GRU, UK	YES
HRI-GRU GBR006	-20° C	not controlled	YES	CGN, NLD	YES
UPV ESP026	3° C	5-6%	Partly	CRF,MBG, ESP027, ESP	NO
CSIC/MBG ESP009	2° C	60%	YES	CRF,UPV, ESP	NO
CSIC/IAS ESP169	4° C	20%	YES	perspective CRF, ESP	YES
NGB SWE002	-4° C	not controlled	YES	NGB, Svalbard	NO
IPK DEU146/271	-18° C	8% storage cont. 65% cold chamber	YES	IPK at IPKM and vice versa	YES to some extent
IGB ITA004	-20° C	not controlled	YES	Partly duplicated at IPK and HRI-GRU	YES
GGB GRC005	-20° C	not controlled	NO	partly duplicated in Madrid (G. Campo)	YES
INRA FRA010	-20° C	not controlled?	NO?	perspective to CGN	NO
BPGV PRT001	-20° C	not controlled	partly	Partly duplicated at HRI-GRU	YES
VIR RUS001	-10° C	6 %	NO		NO
IVCSP YUG025	-4° C	not controlled	NO		YES
RICP (Olomouc) CZE061	-20° C	5-6%	YES	Partly in RICP (Prague) and Slovak Rep.	