



Progress and synthesis report on the establishment and operation of AEGIS

(Prepared for the 11th Steering Committee meeting, Sarajevo, Bosnia and Herzegovina, 2-5 September 2008)

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1. Introduction

This report deals with the progress made with the establishment of AEGIS since its Tenth Steering Committee Meeting in September 2006. The decisions made by the Steering Committee regarding AEGIS have been used as the basis for this report and these decisions are summarized in Chapter 2 below. Most of the more specific information included in this report stems from the Model Crop Groups, in particular from the results achieved during the recent Model Crop Curators and Database Managers Meeting in Poland.

Progress made in the last two years has reached a stage where the Steering Committee will need to take formal decisions in order to endorse the proposed continuation of the implementation of AEGIS. Points requiring decision are highlighted with grey shading in the text below and identified with chapter number and P (for Proposal).

All the Annexes are provided online at:

http://www.ecpgr.cgiar.org/SteeringCommittee/SC11/SC11_backdocs.htm.

2. Decisions of the Steering Committee at its Tenth Meeting in September 2006

During its Mid-term meeting, the Steering Committee took the following decisions with respect to AEGIS, as reported in the Minutes and as included below. Details on the implementation of these decisions are provided in the subsequent chapters of this document. Decisions marked with an asterisk (*) have been elaborated by the participants in the Model Crop Curators Meeting in Poland, July 2008 (see below).

Decision 1

The Steering Committee recognized the relevance and importance of the Strategy Framework for the implementation of the AEGIS Discussion Paper as a general approach. The existing draft should be reviewed in the light of the discussions at the meeting and that the document should be published as an ECPGR product after consultation with the National Coordinators for their comments.

* Decision 2

More details on the European collections of the four model crops are necessary in order to further develop the AEGIS model, including:

- a. Development of criteria for the identification of Most Appropriate Accessions (MAAs) (see **chapter 8**)
- b. Identification of MAAs, i.e. developing the list (**chapter 9**)
- c. The development of quality systems (**chapter 7**)
- d. Recommendations on how to involve all relevant stakeholders from the European region (**chapter 5**)
- e. The Model Crop Groups to provide a report addressing the above-mentioned activities (**chapter 4**)
- f. The Secretariat to provide an integrated report featuring a synthesis and generic conclusions on the further work of the four model crops (**this report**).

* Decision 3 (chapter 6)

To make calculations as soon as possible of the costs of the maintenance of the collections of the model crops (to allow comparison of costs before and after introduction of AEGIS). A draft study outline is requested from the Secretariat.

* Decision 4 (chapter 7)

The development of draft quality management systems for the four model crops was regarded as vital. In-kind contributions by genebanks and/or member states will enable this effort.

* Decision 5 (chapter 9)

To develop a list of proposed specific accessions of each of the model crops to be designated for their incorporation into the European Collections. The four Model Crop Groups are each requested to perform such exercise.

Decision 6 (chapter 10)

The development of a draft Memorandum of Understanding (MoU) for signature by the Ministries, specifying the political consent of the national authorities for task sharing, and taking into account the relationship with the obligations of the IT. Such a MoU will include attention for the possible transfer and exchange of accessions. The development is the responsibility of, and might be overseen by, the AEGIS Advisory Committee.

Decision 7 (chapter 11)

Development of a draft model institutional contract covering operational issues related to the implementation of AEGIS. The Steering Committee proposed that a sub-group of the AEGIS Advisory Committee, in collaboration with managers of institutions holding collections should be given the task of advising on such a model institutional contract and that the ECPGR Secretariat initiates the task.

Decision 8 (chapter 12)

To conduct a survey of (potential) capacity and availability amongst European institutions with the aim of developing European task-sharing in the context of AEGIS. This task will include an assessment of the need for upgrading various facilities and training new experts. The ECPGR Secretariat is requested to conduct this survey.

Decision 9 (chapters 13, 14 and 15)

The ECPGR Secretariat to start the process of further preparation of draft decisions and possible implementation mechanisms for the AEGIS concept.

Decision 10 (see paper “ECPGR and the European Union: a strategy for collaboration”)¹

Formulate a short strategy paper, to be addressed to the EC, in its capacity as a Party to the International Treaty, and strongly set out the relevance of the ECPGR for the EU, with the ultimate aim of establishing a permanent collaboration. Bioversity International offered to prepare the first draft of this document, to be circulated to the Steering Committee for comments and subsequent adoption.

3. The Strategic Framework for the implementation of AEGIS

The “Strategic Framework for the Implementation of a European Genebank Integrated System (AEGIS)”, based on a number of iterations, many discussions with different groups of stakeholders and close consultations with the Steering Committee, was finally agreed upon (in August 2007) and published (beginning of 2008 with a print run of 1000 copies as well as the uploading of the final document on the AEGIS Web site as a discussion paper).² Due to some procedural as well as factual differences of opinion between some SC members regarding some of the aspects which could not be resolved before printing, it was not possible to publish the paper as a consensus document but “only” as a discussion paper. However, it is fair to state that the Strategy Framework paper reflects a far reaching agreement on almost all the key considerations and elements of AEGIS and, consequently, the publication will provide a solid basis for the further developments of AEGIS.

4. Reports of the Model Crop Groups

The reports on the progress made by the four Model Crop Groups are provided as separate background documents:

- Annex 1: *Allium*
- Annex 2: *Avena*
- Annex 3: *Brassica*
- Annex 4: *Prunus*

Please note that these reports have provided the basis for the synthesis for most of the items reported in the chapters below.

¹ http://www.ecpgr.cgiar.org/SteeringCommittee/SC11/Docs/EU_ECPGR_strategy_2008_brief.pdf

² http://www.ecpgr.cgiar.org/AEGIS/Docs/AEGIS_DiscussionPaper.pdf

5. Involvement of relevant stakeholders of the European Region in establishing and operating the European Collection

The Model Crop Curators meeting indicated that the involvement of stakeholders in the process of establishing the European Collection and its subsequent management is expected to largely take place at the national level. Consequently, it was proposed to request the National Coordinators to undertake proactive steps in identifying and involving relevant stakeholders in the aforementioned process and subsequent management of the Collection, as appropriate. Where relevant, the National Coordinator should consult with the respective Working Groups for any advice.

It was further noted that in several countries, the private sector is playing an increasing role in conservation efforts and that it would require pro-active and targeted steps to involve them in AEGIS activities.

A presentation on AEGIS was offered at the 18th EUCARPIA Genetic Resources Section Meeting in May 2007. This was received with favour by the audience of breeders, who expressed their hopes and expectations to see further progress made, especially with regard to the possibility of ensuring well regulated and easy access also to the IT's non-Annex I crops in the near future.

AEGIS was also presented by Frank Begemann on the following occasions with great positive response, showing that the breeders (European Seed Association, ESA and German Seed Association, BDP) are very supportive of AEGIS:

- ESA Annual Meeting, Brussels, Belgium, 16 October 2007
- BDP Annual Meeting, Bad Dürkheim, Germany, 7 May 2008
- Ninth Conference of the Parties to the Convention on Biological Diversity (CBD/COP9), ESA side event, Bonn, Germany, 30 May 2008.

It was also noted that in many countries, whilst NGOs play an important and active role in the conservation of genetic resources, they might not be able or willing to participate in AEGIS, either for political or technical reasons. Consequently, where applicable and wanted, it was suggested to strengthen the capacity of interested NGOs at the national level in order to enable them to fully participate in the AEGIS process. It was understood that such involvement will be facilitated if the key stakeholder groups are represented in the coordination mechanism of the national plant genetic resources programme.

6. Observations on the framework and tool for the assessment of operational costs for collection maintenance

With the assistance of the recently employed Senior Economist by Bioversity International and the direct involvement of an IFPRI employed Economist, specialized in economic aspects of genebank operations, a general draft methodological framework to evaluate the cost-effectiveness of germplasm collection management was prepared and brought to the attention of the Curators and Database Managers of the four model crops during their meeting in Poland early July. This draft will be provided for information as a separate background document (Annex 5).

In addition to the methodological framework the consultant also prepared a tool to collect and calculate the specific costs of the routine genebank operations that were recognized and listed as per Table 1 below.

The tool is a series of four Excel spreadsheets, i.e.:

1. Capital costs;
2. Quasi-fixed labour costs;
3. Non-labour costs; and
4. Variable labour costs

It allows a systematic collecting of the data and has an automatic built-in calculation feature of the various components.

Table 1. Recognized routine genebank operations used in the draft cost assessment tool

Acquisition	This may involve the collection activities in the fields or the activities related to receiving and processing newly introduced accessions.
Characterization	This is the activity of recording the characteristics of each accession, often conducted during the regeneration process.
Safety-duplication (or security-duplication)	This is the activity of sending sample accessions to different location for safety reasons (i.e. backup collection).
Long-term storage	This activity is for the conservation of accessions in the long-term storage facility. Cold room, cryopreservation mainly.
Medium-term storage	This activity is for the conservation of accessions in the medium-term storage for ready dissemination upon request. Tissue culture, cold room, field genebank.
Germination testing (or viability testing)	This is the (periodic) activity of testing germination rate of existing or newly multiplied accessions.
Regeneration (or multiplication)	This is the activity of getting fresh seeds by planting out seeds for storage or dissemination.
Seed processing	Packing, cleaning, drying.
Seed health testing	This activity involves the testing of seed health, often carried out upon acquisition or during regeneration process.
Dissemination (or distribution)	This involves the activity of sending accessions upon request (e.g. preparation, shipment, etc).
Information and data management	This activity includes data entering, processing and management (including catalogue preparation).
General management	This is the activity that is difficult to allocate to specific activity (e.g., genebank manager's work).
Other 1	You can allocate another type of activity in this category.
Other 2	You can allocate another type of activity in this category

Both the methodological framework and the cost assessment tool were introduced to the Model Crop Curators and Database Managers Meeting and discussed with them. Due to the complexity of the proposed tool and the anticipated in-kind contributions that this would require from the participating persons, only the *Allium* (garlic) Group decided to participate in an assessment of the cost. The agreed first step would be a validation of the tool for IPK, Gatersleben later this year, using the routine field genebank, *in vitro* and cryopreservation activities and then to apply the validated tool at the other *Allium* Network sites. This would allow a baseline to be established of the operational costs prior to the introduction of AEGIS, and thus to see how the costs would evolve through the introduction of AEGIS. It should be noted that it became apparent from the aforementioned meeting that there will be considerable differences between crops and that possibly some more test cases should be considered.

It was also argued that the conservation management costs in a decentralized system would not change for each individual institution (i.e. AEGIS would be cost neutral). A comparison of the costs across genebanks might identify that some genebanks are more cost effective than others, although this exercise was only partially relevant for AEGIS. For example, the cost of regeneration may widely differ throughout Europe, but the regeneration location should be primarily determined by environmental factors or the availability of land, equipment and overall quality of the operations, and not only on the basis of lower costs.

It was also argued that the main additional costs of AEGIS would be related to coordination among genebanks. These costs are equivalent to the inputs in kind that have always been recommended in order to implement the ECPGR Working Group work plans. AEGIS will make a difference in the sense that these inputs in kind will need to be budgeted by the national programmes in order to comply with the agreed responsibilities (see also Chapter 14 for further details on in-kind contributions).

6.P. Proposal by the Secretariat regarding collection maintenance operational costs

Considering the discussions during the Model Crop Curators and Database Managers Meeting in Poland, the Secretariat proposes to accept the offer from IPK to validate the tool for *in vitro* and cryopreservation activities of garlic, and to apply the validated tool at the other garlic conservation sites of the *Allium* Network.

The Steering Committee is requested to advise on how best to proceed with the establishment of baseline conservation costs for other crops, i.e. for the other three model crops and/or other volunteer crops from other Networks.

7. Establishing an AEGIS Quality System (AQUAS)

One of the key requirements for effective and efficient collaboration among partners in a “virtual genebank” operation will be the availability of a framework that facilitates quality performance while implementing routine activities for a given crop, provides transparency to the operations, allows monitoring and thus allows trust to develop or to be strengthened between partners.

In order to initiate a discussion on the topic a general discussion paper was developed by the Secretariat and Theo van Hintum (see Annex 6) and shared with the participants in the Model Crop Curators and Database Managers Meeting. After a presentation to the meeting introducing the topic and presenting the proposed principles of a quality system, a discussion took place and the results are reflected in the various sub-chapters below.

In addition to the above-mentioned discussion paper, the Secretariat shared a table (prepared by Bioversity) with compiled international technical standards for the management of seed collections with the Model Crop Curators. Furthermore, the following additional documents were shared: general *in vitro* standards and best practices, best practices and standards for field genebanks and for *in vitro* and cryo-genebanks as inputs into the processes of the Model Crop Groups in developing crop-specific technical standards.

It was pointed out that it was misleading to use the expression “Quality Management System” (QMS), since people would associate this to the rather rigid, complicated and expensive process of ISO 9000 certification. Since this type of certification would not be the target of AEGIS, it was preferred to simply talk about an “AEGIS Quality System” and the acronym “AQUAS” was created at this occasion.

7.1. General observations on establishing AQUAS for model crops

The establishment of an AEGIS quality management or assurance system has been recommended by all model crops as desirable or even essential. The point has been made that such standards will be even more important for crop wild relatives as well as wild species as they are difficult to manage (especially to regenerate), some are noxious weeds and the environmental conditions in Europe might not be suitable to grow the species. It was noted that such a system should be as little bureaucratic as possible. Furthermore, concerns were expressed that such a system should be pragmatic rather than doctrinaire and that it should be recognized that different participating collections can achieve satisfactory standards in different ways. Furthermore, the general principles are more important than over-prescriptive protocols.

The establishment of an AEGIS “body” has been suggested to implement a quality system and to monitor the generic standards. Such a body could also be given the task to organize external audits, preferably covering multiple crops. The crop related activities should be internally audited by the respective collection holders and reported to the respective Working Groups.

7.2. Comments on the proposed principles and elements of AQUAS

The proposed principles in the discussion paper were acceptable to all the Groups. The concept of planning (i.e. the technical standards), doing (getting the National Coordinators (NCs) to agree when signing the MOU and the Curators to implement them), checking (self-checking or auditing, e.g. using a “logbook” and/or external checking or auditing), and acting (NCs to arrange for capacity building, Curators to respond on how to improve the system) was found useful and agreeable. The proposed elements also met the support of the Model Crop Groups with possibly the reporting and monitoring elements to be the ones most debated.

7.3. Recommendations on “generic” technical (genebank management) standards

The Model Crop Groups prepared general and specific technical standards for most of the routine operations, albeit with a variable degree of specificity. Some of the Groups need to do some further work on the standards. The suggestion to include general standards and procedures of, for instance, genebank documentation, safety-duplication and germplasm distribution into AEGIS strategies was appreciated and it was observed that this could well work at such a more generic level. The need for an independent standing technical committee to ensure comparable standards across crops was not explicitly commented on.

7.4. Recommendations on crop-specific technical standards

All the Groups prepared crop technical standards for most of the routine conservation and regeneration operations. These will have to be shared with the respective full Working Groups for endorsement. The *Avena* Group pointed out that for the wild species very little or no specific information exists concerning the technical cultivation standards. For each of the routine cultivation activities of both, cultivated and wild

species, they identified aspects for which the WG has to agree on which methodologies to apply. One Group had conducted a survey on current practices in genebank management in Europe and was able to take full advantage of the outcome of the survey in reaching a consensus on the technical standards.

7.5. General comments and observations

The concern was expressed that with the introduction of a quality management system, the necessary flexibility for running a genebank or maintaining a collection could get lost. However, this concern was not experienced by all Groups.

7.P. Proposal by the Secretariat for an AEGIS Quality System (AQUAS)

The Steering Committee is invited to consider the establishment of an AEGIS Quality System (AQUAS), according to the draft elements outlined below. Once agreed by the Steering Committee, the AQUAS elements suggested below will become one of the pillars of AEGIS.

General description of the AQUAS system

The AEGIS Quality System is based on the philosophy that partners conducting technical duties for AEGIS do what they say, say what they do, and that this can be verified and monitored. Therefore, the onus of AQUAS is very much with the individual partners, but with a few mechanisms and processes that facilitate regional operations, reporting, monitoring and oversight. The proposed specific elements that make up the AQUAS system and the corresponding action points are:

- a. Each associated member of AEGIS will prepare a manual that contains descriptions of the routine genebank management procedures and practices, with reference to operations listed in Table 1 and will make it available on-line (within one year from signing of the MoU).
- b. Technical standards for the crop-specific operations will be developed, discussed and agreed upon by the Working Groups, within one year from the establishment of an AEGIS list of accessions for the respective crop; the Working Group agreement will need to be endorsed by the Steering Committee.
- c. An effective system of record keeping of verifiable facts of collection management activities (Table 1) will be put in place by all associated members of AEGIS (within one year from signing of the MoU).
- d. Working Groups will assume the responsibility for monitoring the application of these standards (based on self-auditing and reporting as well as external audits, when necessary), for providing feedback to the National Coordinators with concrete suggestions for improvements, capacity building suggestions etc., and for reporting to the Steering Committee. It is left to the Working Groups whether or not to consider a special focal point or a sub-committee for these duties. Working Groups will report to the Steering Committee about the implementation of the monitoring system within two years from the establishment of an AEGIS list of accessions for the respective crop.
- e. A proposal for an efficient monitoring approach at the multiple crop and regional level will be developed by the ECPGR Secretariat within 1 year from AEGIS entering into force.
- f. The establishment of an independent standing technical committee (by the Steering Committee) is proposed with the objective to verify comparability of AQUAS performances across crops/Working Groups/countries, including provision of feedback on proposed standards and oversight of the external monitoring process.

8. Establishing requirements and selection criteria for the identification of the Most Appropriate Accessions (MAAs)

The concept of identifying the “most original sample” was already discussed during the feasibility study phase. The Secretariat started to work more systematically on this subject at the end of 2006 and shared evolving draft documents on the selection criteria for the identification of the MAAs with the *Avena* Group during a Global Oats Germplasm Strategy meeting in St. Petersburg (March 2007), with the *Allium* Group during the start-up meeting of the EURALLIVEG project in Quedlinburg (April 2007), and with the *Brassica* Model Crop Group during the Vegetable Network Meeting in Olomouc in June 2007. During the more recent Cereals Network Meeting in Foça, (April 2008) discussions continued with the *Avena* Model Crop Group and an alternative approach was suggested to invite the countries to propose MAAs to the Working Group and to assist the countries with priority criteria to select. However, during the recent Model Crop Curators and Database Managers Meeting in Poland (July 2008) the Model Crop Groups agreed to do away with the

primary and secondary selection criteria and to establish (1) requirements that need to be fulfilled by all European Accessions and (2) crop-specific selection criteria that are used to identify the MAAs. It is this latter decision that is being presented below. However, the *Prunus* Group agreed on a list of germplasm categories they would like to see used, but without according any priority to them:

- Traditional cultivars and/or landraces.
- Old and/or obsolete cultivars.
- Modern cultivars, bred with conventional methods.
- Significant breeding lines.
- Genetic stocks, mutants and seedlings of mapping progenies.
- Crop wild relatives.

The *Avena* Group established a similar list and indicated the likely degree of uniqueness for these categories:

- Wild species (most of collected accession are unique)
- Landraces (local) (most of collected accession are unique)
- Obsolete improved varieties (all collected before 1950s are unique)
- Advanced improved varieties (to divide to unique accession and duplicates)
- Breeding/research materials (most of collected accession are unique)

8.1. Recommended requirements

General aspects

1. Approved by the ECPGR Steering Committee;
2. Fully discriminative.
3. All European Accessions will need to comply with all requirements.

Requirements

1. Material under the management and control of the member countries and their associate members and in the public domain.
2. Genetically unique, to the best available knowledge (i.e. genetically distinct accessions; assessment based on available data and/or on the recorded history of the accession).
3. Plant genetic resources, including:
 - a. Medicinal and ornamental species
 - b. Crop Wild Relatives
 - c. Used wild species.

Excluded are:

- a. Non-plant agrobiodiversity species.
 - b. Forest genetic resources species.
4. European origin or introduced germplasm that is of actual or potential importance to Europe (for breeding, research, education or for historical and cultural reasons).

8.2. Recommended selection criteria

General aspects

1. Agreed by each WG for their specific crop(s)
2. Not fully discriminative (i.e. selected MAA do not need to fulfil all of criteria)
3. Used when deciding which specific accession to accept among two or more duplicates or groups of very similar accessions
4. Decided by the WGs in which order they should be used
5. Combinable. The selection of accessions could be the result of a combination of two or more selection criteria.

Selection criteria

1. Maintained in “country of origin”
2. Of known origin (whether collected or bred)
3. Accompanied by comprehensive passport information using the EURISCO multi-crop passport descriptors
4. Number of regeneration/multiplication cycles (as applicable and if known; estimates could be helpful)
5. Of high health status, (e.g. virus-free)
6. Accompanied by morphological and/or molecular characterization data
7. Accompanied by agronomical evaluation data
8. Accession name validated (particularly relevant for perennial clonal crops where the same name can be attributed to different accessions; history of individual accessions is important; special attention to be paid to synonyms and homonyms; transparent selection procedure is needed).

During the discussions and as expressed in the model reports, a number of comments on the requirements as well as on the selection criteria were made that might well have a wider application and relevance. Consequently, these points for the requirements are summarized herewith:

- a. Individual accessions might have a high level of genetic diversity within accession and thus the concept of genetic uniqueness was difficult to apply. *Comment: It is argued that such accessions are almost per definition MAAs as long as they are not straight duplicates.*
- b. It is difficult, or even impossible, to apply molecular tools to study such genetically diverse accessions, in the case of seed samples with a very high degree of diversity within accessions.
- c. In some cases, crop wild relatives are timber species. In those cases the respective Working Group will have to judge whether to consider these eligible for the European Collection or to be considered forest genetic resources and decide accordingly.
- d. The *Avena* Group expressed a concern that possibly the most important criterion of not including accessions in the list of MAAs might be the lack of information on some of the requirements.
- e. Although the selection criteria were thought to be rather crop-specific, it was striking to see how similar the list of selection criteria was for most of the crops. Nevertheless, during the discussions at the meeting of the Model Crop Curators and Database Managers, it became clear that there were some fundamental differences between the crops and this will be reflected in the criteria. For example, the term “genotype” represents in the case of *Prunus*, a set of accessions that all belong to that same genotype. Consequently, the MAAs will be selected from this set of accessions that belong to the same genotype. The *Brassica* Group conducted a little experiment on the application of the selection criteria by two independent individuals and compared the (very interesting) results thereafter (see the *Brassica* report). The Group also proposed a specific “workflow” of applying the selection criteria for all accessions that had an accession name included in the database.

8.3. General observations and comments on the process of developing the criteria and lessons learnt for other crops

Based on the experiences obtained, and considering the fact that the Model Crop Groups followed somewhat different ways to establish the selection criteria, it seems to be of limited use to try to suggest a generic procedure to be followed by other crops. The importance of sufficient and good quality data has been stressed by all the Groups. Especially, the lack of data in the databases does not permit an objective and unequivocal approach. It was further noted that some important crop collections are not at all represented in EURISCO or in the Central Crop Databases (CCDBs) and thus, such material would not be recorded as potential MAA. Consequently, it has been noted that additional efforts will have to be undertaken to include and/or improve data, primarily in EURISCO, and consequently in the CCDBs. The *Avena* Group suggested a number of approaches that would allow deciding whether or not two or more accessions are duplicates, including field observations, protein markers, estimating genetic distances using morphological traits or molecular markers.

8.P. Proposal by the Secretariat regarding requirements and selection criteria

It can be concluded from the experiences so far that the concept of developing requirements and selection criteria, and to use these for the identification of individual accessions that comply with such criteria, actually works. Consequently, the Secretariat proposes the following actions:

- i. The Steering Committee to endorse the requirements as included under point 8.1.
- ii. The Steering Committee to take note of the list of selection criteria and to provide any comments.
- iii. The Steering Committee to ensure that the respective National Inventories include all relevant collection data and these are transferred to EURISCO.

9. Establishing the list of MAAs

No detailed guidance on how best to go about this process was provided to the Model Crop Groups other than a brief description in the Strategic Framework discussion paper and in the draft MoU. However, in the absence of agreements with countries, it was not possible for the model crops to formally approach them and ask them to propose MAAs for the respective crop. Consequently, the only feasible way for the Model Crop Groups to prepare the lists has been to use the existing databases, i.e. EURISCO and the respective CCDBs. Summaries of the experiences and the results are provided below.

9.1. The procedure followed, including the respective roles of associated institutions, the countries (i.e. National Coordination institutions), the Central Crop Database Manager and the Working Group

Each of the Model Crop Groups followed a slightly different procedure in establishing the list of MAAs. In three cases they relied on the data available in the CCDBs as the AEGIS implementation process has not yet directly or actively mobilized the countries in the process of identifying MAAs, whereas *Allium* used a specially established project database to conduct the exercise. The involvement of countries will only happen after they sign the MOU and consequently initiate the identification of the MAAs. For three of the model crops, the CCDB Manager has been, or will be, the key person and is expected to first update the CCDB.

Avena, *Brassica* and *Prunus* prepared each a well defined stepwise procedure to identify the MAAs (see respective reports) whereas the *Allium* Group used a CCDB rebuilt project database of “pre-selected” accessions that will then be molecularly fingerprinted. The results of the latter are the main selection criterion for selecting the MAAs. For *Prunus* and *Brassica* the question of synonyms was important and the *Prunus* Group devoted a meeting to this problem and is in the process of identifying a standard procedure on the identification of the euonyms (euonyms are convenient names chosen from various synonyms and variant spellings to aid cross-referencing of these in the central database). The *Avena* Group sees the updating and completing of the data available in the European database by the Curators as the first and essential step before proceeding with the identified process.

It should be noted that *Allium* is following a very well defined procedure as part of an EU-funded project. This project will eventually lead to the establishment of a cryopreserved collection, held by three institutions, of unique European *Allium* accessions. The process is thorough, expensive and does unfortunately not include all the European countries with *Allium* collections. Efforts are being made to bring some more countries in, supported by the ECPGR Vegetables Network budget, although the available funds will not allow dealing with all accessions.

9.2. Generated list of MAAs (for the model crop in question and based on Central Crop Databases)

For two model crops, *Avena* and *Prunus*, provisional lists of MAAs were elaborated and experience gained, both with the comprehensiveness as well as the quality of the data. In the case of *Prunus* out of the 2,731, sweet cherry accessions registered in the EPDB, 1,116 were considered as unique accessions plus 367 reserve or safety-duplicates. For *Avena*, based on tentative searches in the European *Allium* Database (EADB), from a total of 32,769 accessions, 8,131 had very poor passport data and could not be included in the duplicate search, whereas 7,273 were considered to be unique, which coincides with 53% of the well-documented accessions. However, the *Avena* Group was not able to provide a final list as they see a clear need for several meetings and correspondence between Curators and the EADB before being able to generate the final list.

9.3. Experiences with the use of the requirements and selection criteria while establishing the list

The experiences of the four Model Crop Groups are rather diverse and do not allow to draw firm conclusions at this stage. Whereas the essential use of the CCDBs was confirmed, in most cases, after the selection of the most adequate descriptors, a number of shortcomings and problems were also encountered. The already mentioned lack of updated data for many of the countries, the presence of non-comparable data

sets (EURISCO vs. CCDBs), and the incompleteness of certain data sets make the selection of MAAs too uncertain and based on subjective judgement.

It seems apparent that the exchange of experiences by the Model Crop Groups with each other, but also with other crops, is an important way of sharing lessons learnt and to build up an important body of knowledge for the future.

9.4. Lessons learnt for other crops

Some lessons have been learnt from the establishment of draft MAAs lists that could apply to other crops as well:

- a. The quality and the comprehensiveness of the passport data is an important pre-condition for the identification of MAAs.
- b. Clarification of existing synonyms is critically important to help identify the MAAs (certainly applicable to the other fruit species).
- c. Some standard EURISCO descriptors need to be clarified in order to proceed.
- d. The flow of information between Curators, CCDBs, EURISCO and National Focal Points needs to be clarified.

9.5. Suggested procedure to establish the AEGIS list of MAA, with a focus on the relationship between the Working Groups and the National level

The Strategic Framework document outlines the implementation process of AEGIS and the roles of the various players in the system. In the context of the identification of MAAs the roles are defined as follows:

- **National Coordinator** will identify and offer the accessions to be registered to AEGIS and ensure that AEGIS activities agreed upon for the National Programme are efficiently coordinated with all participating institutes.
- **Crop Working Groups** apply the MAA concept to identify the list of tentative accessions to be registered (Box 3, Framework Strategy Document). It is noted in the Strategy Document that the application of the MAA concept works "top-down" and "bottom-up".

The duality of this concept allows several working patterns to be considered by national programmes.

1. A national programme offers all the accessions included in the EURISCO and/or the Central Crop Databases as potential AEGIS accessions for consideration by the Crop Working Groups.
2. A national programme asks their crop specialists to prepare lists of accessions for each crop representing the unique diversity (genetic, cultural, etc.) within the national collections to be offered to the AEGIS system. Some national programmes already have formal/informal national crop groups or networks that could perform such a role.
3. The Crop Working Groups consider the national proposals in the context of the crop gene pool and recommend lists of MAAs to each national programme. In (1) and (2) above the Crop Working Groups may receive proposed lists of accessions from national programmes that do not have a representative on the respective Crop Working Group. In such cases it will be imperative that the AEGIS has a mechanism for Working Groups to communicate directly with National Coordinators and their crop specialists. It may be that a Crop Working Group will ask a National Coordinator to consider the inclusion of additional material in the AEGIS where the material is known to represent a unique part of the crop gene pool and is not available elsewhere.

9.5.1. Suggested procedure

AEGIS offers national programmes the unique opportunity to develop the relationship between the National Coordinators, the national crop specialists and their representatives on the Crop Working Groups. It is clear the mechanism for the identification of MAAs in working groups, based on lists of approved accessions agreed by national programmes, will require very close cooperation between all parties. In this context the members of the Crop Working Groups are in the unique position of considering tentative MAAs at the level of the Working Group and acting within their national programme in an advisory role to assist the National Coordinator and national crop group/network to identify the list of accessions for their crops to be offered for AEGIS registration by the National Coordinator. Therefore, in AEGIS, the relationship of the national crop specialists (NatCropSpec) and the national coordinators providing a top-down

(WG - NC - NatCropSpec) and bottom-up (NatCropSpec – NC – WG) dialogue will be critical in order to promote the efficient and successful execution of the registration of accessions in AEGIS.

9.P. Proposal by the Secretariat on how to proceed with the establishment of lists of MAAs

The Steering Committee is invited to decide on the most appropriate process for identifying MAAs. The Secretariat appreciates the proposal made above (i.e. point 9.5) that is based on the discussions with the Model Crop Curators and Database Managers.

10. Draft Memorandum of Understanding

The process of developing the MoU was led by a small Bioversity International Task Force in close consultation with, and under the supervision of, the AEGIS Advisory Committee. Due to its anticipated significant importance, it was decided rather early on in the development process to consult with the National Coordinators, i.e. the Steering Committee members, and two rounds of consultation through email were conducted. The interactions have resulted in a document that consists of the main agreement text, including the following chapters: 1. Definitions; 2. Establishment of AEGIS; 3. Countries and regional organizations eligible for membership in AEGIS; 4. Objectives of AEGIS; 5. Relationship of AEGIS with ECPGR; 6. Responsibilities of members of AEGIS; 7. Responsibilities of ECPGR National Coordinators; 8. General principles applicable to European Accessions under AEGIS; 9. Associate membership of AEGIS; 10-12. Legal paragraphs (entry into force; termination; amendments etc.; and depositary). The second part of the MoU deals with the Associate Membership Agreement between collaborating genebanks/others and National Coordinators and is, in fact, included as an Annex to the main agreement.

The current draft (see Annex 7) reflects agreements on many of the subject areas between most of the National Coordinators, whereas some aspects have been flagged as needing further discussion and possibly consultation with the authorities concerned in the respective ministries before agreeing on a final text. National Coordinators have been encouraged to pursue such discussions before the Steering Committee meeting in order to allow a decision on the final text. The issues that were brought to the attention of the Secretariat include the same treatment of non-Annex I species as Annex I species; and the level of specificity of the MOU, especially regarding the agreed responsibilities by countries.

10.P. Proposal by the Secretariat on how to proceed with the MOU

1. The Steering Committee is invited to consider the current draft text and to decide on a final text.
2. The National Coordinators assume the responsibility of seeking the signature of the respective Country Representative on the MOU and of the Representatives of the Associated Institutions on the AEGIS – Associate Membership Agreement before the end of 2009.
3. The Secretariat will prepare a “guide” for the implementation of the MOU at the national level in order to ensure that the process will be comprehensive and would allow that all foreseen responsibilities that a given country is prepared to make are being addressed (by December 2008).
4. The Steering Committee is invited to establish a time table for the implementation of the MOU. The Secretariat proposes:
 - a. To proceed with the four model crops and to aim at a conclusion of the various components in two years time, i.e. December 2010. The “final products” will be a list of agreed European Accessions for the respective crop, an agreed Crop Conservation Work Plan and operational AQUAS.
 - b. Simultaneously, the respective Working Groups of these model crops will extend the implementation of the MOU to other crops that fall within their mandate and bring this to a conclusion in three years time, i.e. December 2011.
 - c. Other Working Groups are encouraged to initiate (or to continue) the process of implementing the MOU as soon as possible and to aim at a conclusion of the process by the end of Phase VIII, i.e. December 2013.

11. Draft model institutional contract

In close consultation with the AEGIS Advisory Committee it was decided to initiate the development process of a draft model institutional contract only upon the conclusion of the MOU, which includes the Associate Institution Agreement. A small AEGIS Advisory Committee sub-group has been formed that will collaborate with institutions holding germplasm collections and advise the AEGIS Advisory Committee on the subject. The actual need for and form of such agreements will become more apparent during the time the Model Crop Groups develop their Crop Conservation Workplans (annual or bi-annual).

Besides the critical importance of having a finalized and agreed MOU with the countries, there is a direct relation between the decisions by the Working Groups on how to arrange for the management of the individual crops of the European Collection, e.g. a semi-centralized or a decentralized approach for conserving the crop collection and the role that institutions are expected to play within AEGIS. Each crop group will therefore need to develop specific contractual agreements, depending on the final structure of their preferred conservation approach.

11.P. Proposal by the Secretariat on how to proceed with the model institutional contract

The AEGIS Advisory Committee sub-group (i.e. Sergey Alexanian, Eliseu Bettencourt, Gert Kleijer and Silvia Strajeru) will initiate the development of the draft model institutional agreement in close consultation with the four Model Crop Groups and will submit their findings to the AEGIS Advisory Committee by the end of 2009.

12. Survey of capacity and availability

The provision of services to AEGIS will be an important aspect of the total operation and is seen as an essential contribution to the establishment and operation of AEGIS, in addition to the acceptance of long-term conservation commitments for the agreed MAAs. These services consist of activities such as storage of safety-duplicates, regenerating parts of the European Collection, accepting the responsibility of operating the Lead Institute for a given crop, accepting the responsibility of operating the central database for a given crop (genepool), providing training and capacity building opportunities, etc.

It was considered that governments have to indicate which services they are prepared and able to commit to the AEGIS (a process foreseen in the MOU) and that such offers for such services have to be considered by, and will ultimately depend on, the decision of the Working Groups. Since each Working Group will also need to decide on how to manage a given crop collection, it was felt premature to initiate this survey before the respective decisions are taken that would underpin such a survey.

It should be noted that ECPGR has conducted a comparable survey in 2001, albeit with a different intention, and it is assumed that this information will provide a good basis and starting point for the identification process.

12.P. Proposal by the Secretariat on how to proceed with the survey of capacities and availabilities

The Secretariat proposes that the "survey" could be combined with the implementation process of the MOU and that the Working Groups play a pro-active role in indicating to the National Coordinators concerned which specific activities they would like to see offered by a given country and therefore to be considered as a commitment.

13. Acquisition of additional funding for AEGIS

It is expected that the operation of AEGIS will depend to a large extent on the in-kind contributions of its members and that these contributions will increase possibly significantly for some activities and possibly decrease for others compared to the current situation, depending on the to be agreed arrangements for the respective crops.

The Secretariat, with the kind support of several ECPGR partners, has been monitoring opportunities for additional funding. A proposal submission to the COST scheme and two submissions to GEN RES Regulation were not successful. At present, calls for proposals within EC 7th Framework Programme (FP) are being closely monitored and, where relevant, action taken. Plans are under way to prepare a proposal for the 7th FP – Capacities/Research Infrastructure that will be published most likely in 2009 as part of Call 6, Spring 2010.

14. General observations on the AEGIS establishment process

14.1. In-kind contributions to (ECPGR and) AEGIS

It has become clear that substantial changes over the past ten years or so have occurred in this respect. Participating partners, i.e. institutes and individuals, are more and more expected to justify the time they spend and increasingly to somehow recover this time through projects, etc. While discussing this aspect with partners and during the Model Crop Curators Meeting it has been suggested that it might be necessary that individuals involved in AEGIS (and for the sake of the argument in ECPGR) do actually plan their ECPGR and AEGIS time as part of their ongoing job responsibilities in their institutes.

14.2. Coordination of AEGIS initiative at the national level

It has been noted that in a number of countries, very little or no discussion on the AEGIS concept took place and/or that AEGIS related activities were not initiated or coordinated. In view of the fact that such coordination is an essential element in the AEGIS operation and that an active involvement of a given country will depend on this pro-active coordination role, it is suggested that National Coordinators consider their time commitment and inputs to the AEGIS process (possibly by following the same route as suggested in point 14.1 above).

14.3. Available financial resources to Working Groups and its members

Closely related to possibly both of the aforementioned points is the lack of funding to most of the Model Crop Groups to pursue necessary activities such as the identification of MAAs, the elaboration of technical standards, etc. Some proposals to the EU (COST and Gen Res) had been formulated and, with the exception of EURALLIVEG none were successful.

14.4. The degree of formalization of AEGIS arrangements

It can be mentioned that a wide diversity of opinions exists on this point, ranging from hardly any formal arrangement, to very detailed arrangements to be made and reflected in the MoU, for instance with regard to responsibility sharing. It seems to be appropriate to strive in all cases for a consensus in order to ensure that particular countries are not being able to enter into the AEGIS system.

14.5. Information management

Several of the Model Crop Groups experienced serious constraints while using the existing information tools, i.e. EURISCO and the Central Crop Databases (CCDBs) in the development of a list of potential Most Appropriate Accessions. For many crops there seems to exist a significant difference between the accessions reported in EURISCO compared to those included in the CCDBs. In addition, many of the accessions have only limited or no information on aspects that are important as a basis for the identification of the MAAs. In order to enable the Working Groups to make sensible analysis of the European collections, it will be of paramount importance that the National Inventories provide to EURISCO, as soon as possible, complete and accurate data of all the accessions that could potentially become part of AEGIS, i.e. National Coordinators should strongly encourage data provision into the National Inventory for all institutions that are ready to become Associate Institutions of AEGIS (i.e. genebanks, universities, research institutions, private collections, botanic gardens and NGOs).

For the establishment and subsequent operation of AEGIS, the constraints raised during discussions and meetings are pertinent and are reported here for attention to the Steering Committee:

- a. In-kind contributions of national partners;
- b. The need for a more pro-active coordination of AEGIS related activities at the national level;
- c. Requirement for additional funds;
- d. Data flow from national level into EURISCO and CCDBs.

14.P. Proposal by the Secretariat on how to proceed with establishment and operation of AEGIS

Considering the requirement for funding of the Working Groups to continue the establishment of AEGIS as well as to initiate its operations, the Steering Committee should take the following analysis of estimated costs and budget requests into account while formulating its decision on allocating the funds for AEGIS activities during Phase VIII.

The Model Crop Groups have proposed costed workplans towards the further implementation of AEGIS:

1. The *Allium* Group has planned for a gradual 3-step approach in order to implement AEGIS for garlic and shallot. The ongoing EU-funded EURALLIVEG project allows for the establishment of a first list of MAAs for garlic and the introduction of 200 accessions into cryopreservation limited, however, to the project partners. ECPGR funds requested through the Vegetables Network budget will allow the extension of the list of MAAs to include the Spain and Portugal collections. The ECPGR-funded meetings will also ensure the necessary AEGIS coordination at the crop level. Additional funds will need to be identified in the future in order to extend the list of MAAs to include all the European garlic and shallot collections, and to provide for the introduction of the MAA accessions into cryopreservation.
2. The *Avena* Group is proposing activities related to the establishment of standardized procedures for the routine operations, expecting the individual Curators to report on the applied methods and followed by a synthesis of these reports by the Working Group. This will allow to establish the technical standards as well as to initiate the establishment of the list of MAAs. One important other step will be the updating and completion of the passport data by the Curators in the EADB, following an agreement by the Working Group on what the critical passport descriptors are for the identification of MAAs. The selection of the European Lead Institute for *Avena* is listed as another activity as well as to agree on a central storage of safety-duplicates. Unfortunately, the report of the *Avena* Group did not contain a budget for any of the identified activities. However, from the report it can be concluded that the provision of funds for a number of additional meetings will be required in order to move forward with the AEGIS process.
3. The *Brassica* Group requests from ECPGR the coverage of the expenses of Working Group meetings every two years. This is compatible with the budget request made by the Vegetable Network for Phase VIII, where two meetings are planned during Phase VIII. Other costs are assumed to be covered as inputs in kind from the National Programmes, as part of the routine conservation activities. Financing on a project basis is planned in the area of characterization/evaluation.
4. The *Prunus* Group has foreseen an ambitious and expensive workplan, which includes three meetings during 5 years (€75,000 in total), data enhancement via morphological characterization (€20,000), fingerprinting (€46,000) and health status monitoring (€46,000), safety-duplication which is charged with orchard establishment costs (between €49,000 and €80,000), and public awareness and dissemination costs (€11,000). Of these costs, only the cost of one meeting has been budgeted within the Fruit Network proposed budget. At least the cost of one additional meeting should be covered by ECPGR in order to support the implementation of AEGIS in the case of *Prunus*. Estimate costs for data enhancement and safety-duplication are beyond the possibilities of the current ECPGR budget and external sources of funding should be sought for their implementation.
5. Phase VIII budgets submitted by the Networks foresee AEGIS related activities also for other crops. This is the case for Barley (methodology for selecting a list of MAAs); wheat (selection of draft list of MAAs and agreement on crop quality standards); vegetables (full network AEGIS themed meeting and separate meetings of each WG to pursue AEGIS activities); fruit (AEGIS principles to be analyzed and preliminary work for MAA definition to be carried out for *Malus* and *Pyrus*); grain legumes (revising and improving the data relating to grain legumes in order that the Working Group is in a position to deliver and contribute effectively to the AEGIS project); potato (definition of MAAs and agreement on sharing of responsibilities); and forages (definition of MAAs).

Besides the above mentioned “regular budget” items related to AEGIS, the Secretariat proposes the Steering Committee consider additional funds (€149,000) to support AEGIS establishment related activities that fall outside the regular Working Group budgets and would speed up the establishment process for the four model crops and beyond. Besides an allocation of €6,000 for technical and advisory assistance to individual countries that are in the process of preparing for the conclusion of the MOU and €20,000 for non-budgeted but requested meetings of the *Prunus* and *Avena* Groups, the Secretariat proposes to spend the remainder (i.e. €123,000) on a competitive grant scheme for the model crops as well as “new AEGIS crops” as mentioned under point 5 above. It is proposed that each of these crops can make a formal, well justified request for additional funding in areas such as data acquisition and quality improvement; complementation of ECPGR budgets for regular meetings to allow more participants or to add more time; to deal with any other constraint encountered during the AEGIS implementation process. The model crops should be ensured to receive 60% of the total competitive grant.

15. Concluding remarks

During the past four years, since the initial AEGIS project was started, this concept has gained wide support within ECPGR circles (i.e. Steering Committee and Working Groups) as well as outside. For example, the EUCARPIA Genetic Resources Section welcomed the concept during its last meeting in 2007. The South European Network SEEDNet is also promoting the same approach in its sub-regional context of Southeast Europe. Bioversity International, as well as the Secretariat of the International Treaty (IT) Governing Body, is considering AEGIS as an example for regional collaboration and for consideration by other regions.

According to the feedback received from the Model Crop Groups, AEGIS seems to be feasible and desirable. All the necessary elements have been discussed in theory and possible solutions for the practical implementation have been proposed. At this stage, it will not be possible to further test the feasibility of AEGIS, unless we try to put it into practice!

In the recent past, a few points of reluctance or even some resistance to AEGIS have emerged: (1) The compatibility with the IT and the existing germplasm access legislation, especially with regard to non-Annex I crops. (2) The strong need to ensure the establishment of a quality system, together with some resistance to enforce an (external) monitoring system. (3) The overall cost.

In our understanding, AEGIS is perfectly in line with the International Treaty and it is actually paving the ideal road to ensure its implementation at the regional as well as national level. AEGIS also allows extending the multilateral system to non-Annex I crops on a voluntary basis, which is the principle that the European region has supported during the negotiations of the IT. We now have an occasion to show consistency with the principles that have been advocated!

A framework for the establishment of an AEGIS Quality System has been proposed. By signing the MOU, the countries will be committed to abide by the Quality System, in the form that will consensually be agreed upon.

The cost of AEGIS is not a quantifiable figure. However, by signing the MoU, countries will only commit themselves to conserve, for the long-term and at high standard, those accessions that they agree to maintain on behalf of AEGIS and to make available. Usually, these will correspond to the national heritage germplasm. This cost therefore, has already been included in the national budgets, when the countries decided to implement the CBD and/or the GPA and/or the IT. Additional costs related to establishment of the AEGIS coordination system and of regional integration, are at the moment embedded in the budget of ECPGR. A gradual implementation of AEGIS is therefore an ECPGR activity and it will be more feasible than a "big bang" approach, also considering the high dependency on in-kind contributions from individuals, especially for data management and process coordination. It will, however, depend on the member countries to speed up or slow down further implementation, on the basis of their collective agreement to invest in the project. One option that it is suggested to consider is the possibility that individual countries adopt and fund with extra budgetary contributions "the entire AEGIS process for a given crop".

The endorsement of the MOU by the Steering Committee, to be followed by signatures from the individual countries, are the next essential steps that will make it possible for a newborn AEGIS to effectively come to life and to start flourishing.

★★★

**ECPGR Secretariat
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