

# An update on aegis

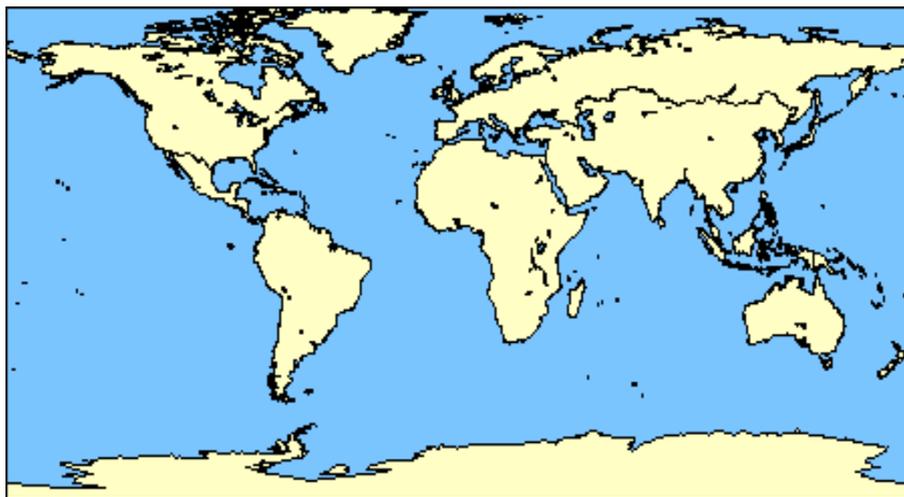
**A European Genebank Integrated System**

**<http://www.aegis.cgiar.org/>**

**Lorenzo Maggioni and Jan Engels  
ECPGR / AEGIS Coordinators**

# Background

## Worldwide



- 1,750 genebanks/collections
- Approx. 7 million accessions
- Estimated 2 million unique
- Example: approx. 148,000 *Avena* accessions (Source: SoW Report II)

## Europe



- App. 625 genebanks/germplasm coll.
- > 2 million accessions
- 30-40% unique (estimate)
- Example: approx. 34,000 *Avena* accessions; held in 45 genebanks in 31 countries (Source: EURISCO, Oct. 2010)

# Background

- **ECPGR:**
  - Reported difficulties in PGR maintenance:
    - ✓ lack of long-term conservation facilities
    - ✓ insufficient safety-duplication
    - ✓ regeneration backlogs
    - ✓ inhomogeneous quality of material
- **GPA** and **International Treaty** call for “efficient and sustainable” system of ex situ conservation
- Substantial unwanted **duplication** of germplasm and efforts

# AEGIS Objectives

To create **A European Genebank Integrated System** for plant genetic resources for food and agriculture, aimed at **conserving the genetically unique and important accessions for Europe** and **making them available** for breeding and research. Such material will be safely conserved under conditions that **ensure genetic integrity and viability in the long term.**

# Perceived Benefits of AEGIS

- Improved **security of germplasm** through long-term commitment and systematic safety-duplication
- Facilitated access to and **availability** of germplasm
- Improved **quality standards** of conserved material
- **Cost efficient** conservation activities
- **Reduced duplication** of germplasm material
- Improved **sharing of knowledge** and information

# Brief history

1. ECPGR Steering Committee (9<sup>th</sup> Meeting, Turkey **2003**):
  - a) **Decision** to initiate and fund a **feasibility study** (mid 2004 – mid 2006)
  - b) Using 4 “**model**” **crops** (i.e. *Avena*, *Allium*, *Brassica* and *Prunus*)
  - c) **Coordination Unit** based at Bioversity International

# Selection of Model Crops

- **Seed propagated** material – annual
- **Annex I crops** of ITPGRFA

- ***Avena***

selfing



- ***Brassica***

outcrossing



- 
- **Vegetatively propagated** material – biennial and perennial
  - **Non Annex I** of ITPGRFA

- ***Allium***

***(Veg.  
propag.)***



- ***Prunus***



# Brief History

2. ECPGR **SC decision** to initiate establishment of AEGIS in 2006
3. ECPGR **Secretariat to coordinate**; an AEGIS Coordinator appointed
4. **Strategic framework** policy guide agreed (2008)
5. **Memorandum of Understanding** (MOU) developed and sent for signature to all ECPGR member countries in 1<sup>st</sup> half of 2009
6. Currently **25** countries have signed MOU



## A European Genebank Integrated System

AEGIS > Membership > Member countries

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About AEGIS

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Structure

Implementation

Documents

### AEGIS Member Countries

The following countries have signed the MoU:

1. **Albania** (6 May 2009)
2. **Azerbaijan** (16 July 2009) - Associate Members
3. **Bosnia and Herzegovina** (19 May 2010)
4. **Bulgaria** (2 December 2009) - Associate Members
5. **Croatia** (2 December 2009) - Associate Member
6. **Cyprus** (15 September 2009) - Associate Member
7. **Czech Republic** (23 July 2009)
8. **Denmark** (22 February 2010)
9. **Estonia** (22 May 2009) - Associate Members
10. **Finland** (2 December 2009)
11. **Georgia** (18 May 2009) - Associate Member
12. **Germany** (9 September 2009) - Associate Members
13. **Iceland** (22 February 2010)
14. **Ireland** (22 July 2009)
15. **Lithuania** (12 October 2010)
16. **The Netherlands** (28 May 2009) - Associate Members
17. **Norway** (17 August 2009)
18. **Poland** (17 May 2010)
19. **Portugal** (20 November 2009)
20. **Romania** (14 April 2010)
21. **Slovakia** (16 June 2009)
22. **Slovenia** (21 September 2009) - Associate Members
23. **Switzerland** (27 May 2009) - Associate Member
24. **Ukraine** (30 April 2009)
25. **United Kingdom** (18 June 2010)

### RELATED INFORMATION



The International Treaty

### Highlights

**Second Call for Proposals - AEGIS Competitive Grant**



# Brief History

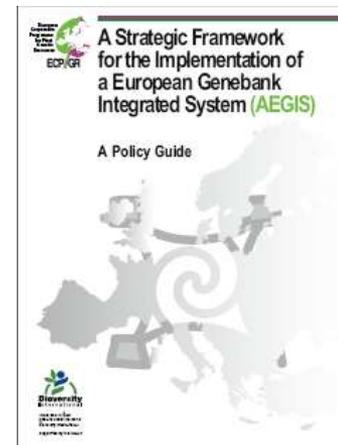
7. Agreement on **development of a Quality System (AQUAS)**; discussion paper
8. Agreement on **requirements and criteria** to select Most Appropriate Accessions (MAAs)
9. Competitive **Small Grant Scheme** launched (to facilitate establishment/operation process); **3** proposals awarded in 2010. **New Call published on AEGIS Web site (deadline 31 December 2010)**
10. EUROGENEBANK proposal submitted to **FP7 Research Infrastructure Call**; met threshold but not selected for funding

# Brief History

11. Template for operational genebank manual (2010)
12. Simplified procedure for selection of European Accessions (2010)

# Key components of AEGIS

1. A **Strategic Framework** for the Implementation of a European Genebank Integrated System - A Policy Guide
2. Formal **agreement** with countries (**MOU**) and institutions within countries (Associate Membership)
3. **European Collection**
4. **Quality System** (generic and crop specific standards; reporting; monitoring; capacity building)



# Key components of AEGIS

## 5. EURISCO as information portal for European Collection



### 35\*. AEGIS Status

(AEGISSTAT)

The coded status of an accession with regard to the European Genebank Integrated System (AEGIS).

Provides the information, whether the accession is conserved for AEGIS.

0 – not part of AEGIS

1 – part of AEGIS

If the AEGIS status is unknown, the field stays empty

## 6. Dedicated AEGIS website: <http://www.aegis.cgiar.org/>

# Legal format of AEGIS

Memorandum of Understanding (MOU) among participating European countries

Associate Member Agreements between individual genebanks wishing to participate in AEGIS and National Coordinator concerned

# MOU

## Why an MOU and not an international agreement?

- To make it easier for countries to join;
- To reflect that this is a form of ongoing programme collaboration among countries;
- AEGIS will operate within the framework of ECPGR.

# Eligibility for AEGIS membership

- Countries and regional organizations listed in MOU that are:
  - **Members of ECPGR;**and
  - **Parties to the Treaty** or are otherwise willing to make plant genetic resources for food and agriculture under their jurisdiction available under the conditions of the Treaty.

# Relationship of AEGIS with ECPGR

- AEGIS will operate **within the framework of the ECPGR**
- **ECPGR Steering Committee** has overall AEGIS responsibility;
- **ECPGR Secretariat** to provide support and coordination;
- **ECPGR Crop Working Groups** to provide technical support, through Crop Conservation Work Plans and recommendations on European Accessions;
- **ECPGR Documentation and Information Network** to provide information infrastructure, including reporting services through EURISCO and national inventory system; and
- **National ECPGR Coordinators** to act as AEGIS coordinators; link with Associate Members; coordination of European Accessions and development of European Collection.

# AEGIS and the Treaty

- AEGIS will operate within the framework of the Treaty in a manner consistent with the Treaty's objectives.
- AEGIS will be part of an efficient and sustainable system of *ex situ* conservation, under Article 5.
- AEGIS will provide a mechanism for regional cooperation in the implementation of the Treaty in the European region.
- Wherever possible, AEGIS will use the Treaty's mechanisms, procedures and instruments, including the Standard Material Transfer Agreement (SMTA), and will thereby contribute to its effective implementation.

# Responsibilities of AEGIS Members

- **Extending mandate of ECPGR National Coordinator** to act as National Coordinator for AEGIS, and providing appropriate support;
- **In consultation with Associate Members concerned, proposing** to the ECPGR Crop Working Groups **lists of accessions for registration as European Accessions** in accordance with agreed ECPGR selection requirements and the General Principles applicable to European Accessions;
- **Registering accessions as European Accessions**, and notifying European Accessions to EURISCO;
- Keeping **list of registered European Accessions** under review;

# Responsibilities of National Coordinators

- Focal points for interactions with ECPGR Crop Working Groups and implementation of Crop Conservation Workplans;
- Identifying and accepting appropriate eligible institutions as Associate Members of AEGIS and promoting and coordinating appropriate support;
- Promoting and coordinating designation of European Accessions and development and management of European Collection;

# General Principles for European Accessions

- AEGIS Members have discretionary rights to propose European Accessions;
- Proposed European Accessions must meet the agreed selection requirements;
- European accessions must be free from any third party obligations or restrictions;
- SMTA to be used for the transfer of Annex I crops;
- Transfer of Non-Annex I crops registered as European Accessions to be under the terms and conditions of the SMTA with explanatory note;

# General Principles for European Accessions (Cont.)

- Management Standards for European Collection to be proposed for each crop genepool by respective ECPGR Crop Working Group and approved by ECPGR Steering Committee;
- Associate Members of AEGIS to perform all selected activities according to agreed standards;
- Public domain accession-level information, as well as non-confidential characterization and evaluation data, to be made available;
- Each European Accession to have identified safety-duplicate stored under the same or better conditions than the original

# Associate Member Agreements

- Associate Members will include genebanks and other institutions holding collections or providing PGRFA conservation related services such as information, evaluation and characterization services, regeneration and plant health services.
- Associate Membership of AEGIS will be voluntary.
- Only institutions located in an AEGIS Member Country are eligible for Associate Membership.
- Potential Associate Members will be identified by the ECPGR National Coordinators.
- They can become Associate AEGIS Members by signing an Associate Membership Agreement with the National Coordinator accepting the responsibilities of an Associate Member. These responsibilities are set out in both the Associate Membership Agreement and in the MOU itself.

# Responsibilities of Associate Members

- Identifying suitable accessions in their institutions to be proposed for registration as European Accessions, and managing those accessions in accordance with regionally agreed quality standards;
- Ensuring long-term conservation of European Accessions according to approved quality standards;
- Facilitating supporting activities such as regeneration, viability testing and others organized by the respective ECPGR Crop Working Group for the crop/species in question;
- Facilitating access to European Accessions and related information in accordance with internationally agreed conditions in line with the Treaty.

# Status of MOU

- Endorsed by the Steering Committee in February 2009
- Sent to National Coordinator for signature in April 2009
- Entered into force after 10th signature in July 2009

# European Collection

## Selection of Most Appropriate Accessions

# The European Collection

- The European Collection will consist of **dispersed accessions (MAAs)**, i.e. a virtual European genebank
- Through signing the **MOU** countries accept responsibilities for **long-term conservation** and **availability of EA**, and to
- Conserve/manage according to **quality standards**
- **Conservation/management strategies** for each crop needs to be prepared by respective Crop WG/NCG and approved by SC

# European collection - current status

- Main players are **Crop Working Groups** and **Countries**
- Proposed **simplified procedure** to select European accessions
- **Selection requirements** have been approved by the Steering Committee
- The **Selection criteria** have been discussed by the model crop groups, without much divergence of opinion
- A **WG agreement** on selection criteria will be required for each crop or crop group

# Selection requirements

1. Material under the management and control of the governments of member countries and their associate members, in the public domain and offered by the associate members for inclusion into AEGIS
2. Genetically unique within AEGIS, 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 for food and agriculture as defined in the International Treaty as well as medicinal and ornamental 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).

# Selection criteria

- Need to be agreed by **each WG** for their specific crop(s)
- Used when deciding **which accession to accept** among two or more “quasi duplicate” or similar accessions / genotypes
- **WGs** to decide if any of these considerations has **prevalence** over the others, or that the selection should be the result of a **combination of two or more criteria**

# Simplified selection procedure of the European Accessions -1

1. WGs (or delegates) to elaborate a list from a crop “pool”, as documented either in EURISCO and/or in CCDB, regardless MoU, Associate members, offers from countries... → LIST OF CANDIDATE ACCESSIONS
2. Agree on selection procedure (ex.: Cucurbits, Forages, Prunus, etc., see AEGIS web site)
  - All selected accessions must meet “selection requirements”
  - Not worry about “governmental control”
  - Mainly focus on genetic uniqueness
  - Can exclude categories, such as: “hybrids”, “unknown accessions”
  - Not a “core collection”

## Simplified selection procedure of the European Accessions -2

3. Selection criteria (crop specific) are used to select MAAs among “duplicates” (also considerations of management practices)
4. WG sends list with candidate accessions to respective NCs for consideration of possible inclusion in the European Collection

# Simplified selection procedure of the European Accessions -3

5. NC, in close consultation with the holding institute(s), indicates to WG whether or not proposed accessions can be included in European Collection
  - Accessions proposed by the WG that are accepted by the country for inclusion, can be flagged in EURISCO as AEGIS accessions
  - WG looks for alternative accessions not confirmed by NC and seeks acceptance for inclusion by a different holder

## Simplified selection procedure of the European Accessions -4

5. WGs regularly revise and update the lists of European Accessions for a given crop. Accessions proposed by the WG that are accepted by the country for inclusion, can be flagged in EURISCO as AEGIS accessions
6. If no WG exists for a given crop, responsibility to be assigned

# **Establishing the list of CHERRY European Accessions, using the EPDB as a tool**

**2,731 sweet cherry accessions registered in EPDB in 2008**

**Process?**

**Draft list of 1,483 European Accessions**

## List of EA generated for *Prunus* based on the EPDB: Choice of genotypes, using primary selection criteria

**2,731 sweet cherry accessions registered in EPDB in 2008**

**Primary selection  
criteria**

**668 accessions were excluded:**

- 267 unnamed accessions
- 70 protected cultivars
- 259 UPOV ref. cultivars from Non-European countries
- 5 mislabelled accessions
- 67 others

**2,063 preselected sweet cherry accessions for AEGIS**

### EPDB descriptors used for the selection

- ACCENAME:** accession name
- ORIGCTY:** country of origin
- SPECIES** [only *Prunus avium*]
- PROTECT:** protection status [No]

**List of EA generated for *Prunus* based on the EPDB:  
Choice of genotypes, analysing duplicates**

**2,731 sweet cherry accessions registered in EPDB in 2008**

**668 accessions were excluded:**

- 267 unnamed accessions
- 70 protected cultivars
- 259 from Non-European countries
- 5 mislabelled accessions
- 67 others

**2,063 preselected sweet cherry accessions for AEGIS**

**1,116 unique accessions**

**947 other accessions**

**1,116 unique genotypes**

**Analysed by the Cherry experts during the  
Fruit Synonyms meeting  
(CRA-W, Gembloux, 2008)**

**How many unique  
genotypes?**

**List of EA generated for *Prunus* based on the EPDB:  
Choice of MAAs, resolving synonyms problems**

**2,731 sweet cherry accessions registered in EPDB in 2008**

**668 accessions were excluded:**

- 267 unnamed accessions
- 70 protected cultivars
- 259 from Non-European countries
- 5 mislabelled accessions
- 67 others

**2,063 preselected sweet cherry accessions for AEGIS**

**1,116 unique accessions**

**947 other accessions**

**1,116 unique genotypes**

**367 duplicate groups**

**Fruit Synonyms meeting  
(Gembloux, 2008)**

**302 in > 1 country  
65 in 1 country**

**1,116 unique accessions + 367 EA after using selection criteria**

## List of EA generated for *Prunus* based on the EPDB: Choice of MAAs, using secondary selection criteria

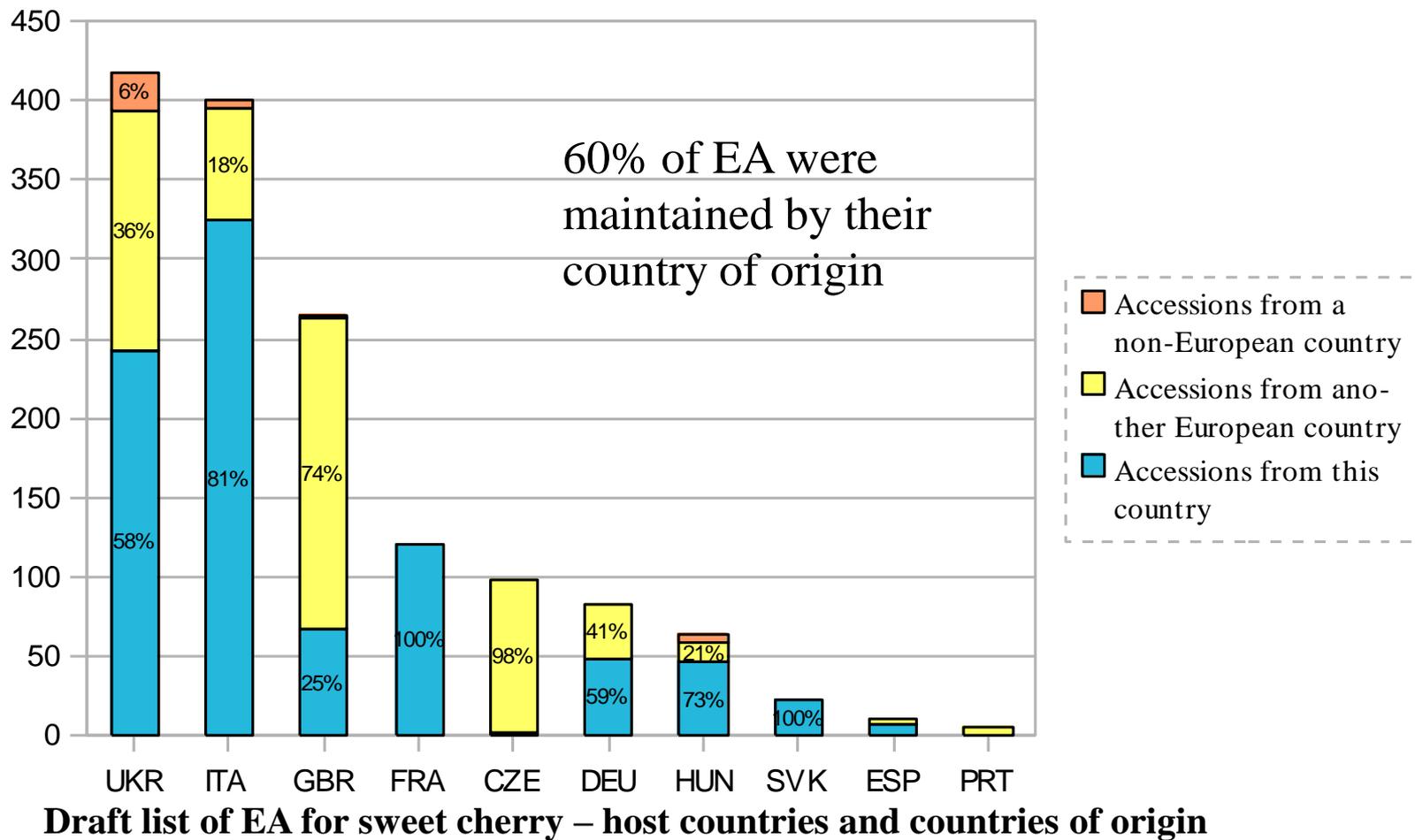
### S Selection criteria

-  Maintained in 'country of origin'
-  Of known origin, whether collected or bred
-  Accompanied by passport information (EURISCO multi-crop passport descriptors)
-  Of high health status, e.g. virus-free
-  Accompanied by morphological and/or molecular characterization data
-  Accompanied by agronomic evaluation data
-  Correctly named (in perennial clonal crops synonyms/homonyms are frequent)

### EPDB descriptors effectively used

- ORIGCTY**
- INSTCODE & INSTDESCR**
- DONORCODE & DONORDESCR**
- BREDCODE & BREDESCR**
- Other passport descriptors (few data) ☹
- VIRUSTATUS** (no data) ☹
- VIRUSDATE** (no data) ☹
- Morphological descriptors (few data) ☹
- Molecular descriptors (no data) ☹
- Agronomical descriptors (few data) ☹
- ACCENAME**
- PREFNAME: preferred name (new)**

## 2A. List of EA generated for *Prunus* based on the EPDB: Analysing the draft list of sweet cherry EA



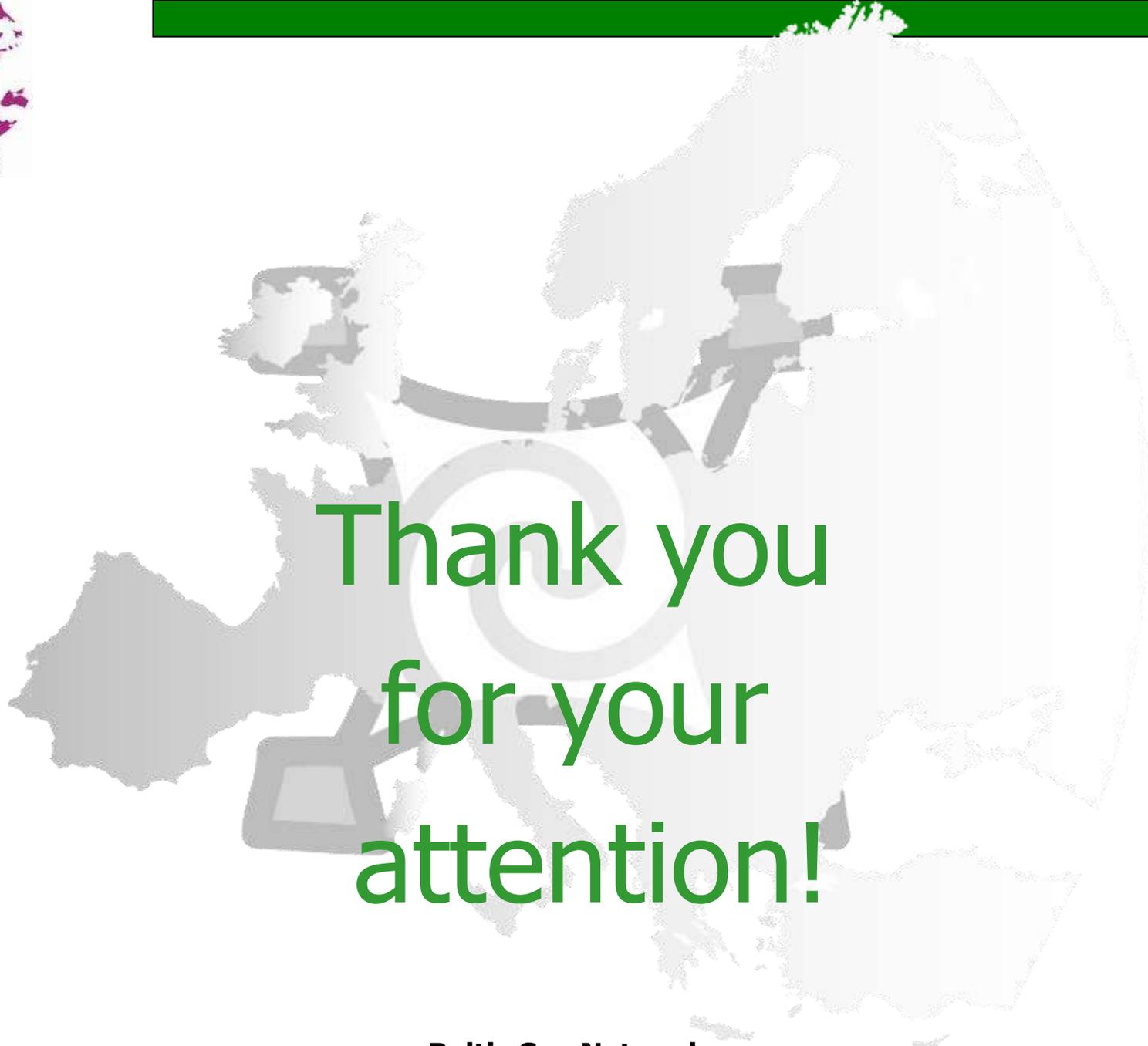
## 2B. Experiences with the use of the selection criteria while establishing the list of sweet cherry EA

### ADVANTAGES

- ☺ EPDB easy to use for the application of selection criteria
  
- ☺ 6 useful passport descriptors:
  - Accession name
  - Synonyms
  - Country of origin
  - Holding institute
  - Donor institute
  - Protection status

### LIMITS

- ☹ No countries had yet offered accessions to AEGIS
  - ➔ All the countries should sign the MoU
  
- ☹ Lack of participation of some countries in the EPDB: important *Prunus* collections are not in contact with the EPDB
  
- ☹ Problems of synonymy and trueness-to-name
  - ➔ Clarification of the existing synonyms and homonyms is very important to help identify the MAAs to be included in AEGIS
  
- ☹ Lack of adequate information could be bottle-neck in selection process: MAAs could not easily be selected if candidates accessions had no-comparable data sets



Thank you  
for your  
attention!

# AEGIS Quality System (AQUAS)

# AQUAS - Principles

Quality system to be based on the principles:

## Quality assurance

- **Plan:** Say what you do
- **Do:** Do what you say
- **Check:** Let an independent body check that you do what you say
- **Act:** Correct and improve what you say you do

Decisions by **consensus**

**Agreed** minimum standards – involve partners; get “buy-in”

**Capacity building** plays a key role

Avoid unnecessary **bureaucracy** (pragmatic; not doctrinaire)

Effective **guidance** and **advisory approach** as **monitoring**

# Technical elements to be established

1. **Operational genebank manual** – all AEGIS Associate Members; based on genebank template (**advanced draft available, version 9**)
2. **Generic operational standards** – Secretariat (cooperation with FAO; comments by curators, WGs)
3. **Agreed minimum crop specific technical standards** – all WGs (complementing generic standards)
4. **Quality management system procedures** – Secretariat; all WGs; Associate Members:
  - a. record keeping
  - b. reporting
  - c. monitoring (not policing, but guiding and advisory approach)

# Capacity building and oversight

## Capacity building:

- If standards are not met -> capacity building (in agreement and possible support from National Coordinator)
- In case funds are not available locally, or through projects -> AEGIS Advisory Committee to assist
- Where applicable, training courses and/or on-the-job training to be organized at Network or Programme level

## Oversight:

- First level monitoring of implementation of AQUAS by WGs
- Second level monitoring across WGs by AEGIS AC
- AEGIS AC to oversee implementation of AQUAS

# Operational framework - 1

## Partners and their major roles/outputs:

### ECPGR Secretariat:

- Prepare draft template for genebank manual
- Draft generic operational standards

### Working Groups or NCGs:

- Draft minimum standards by crop
- Organize reporting system
- Organize/implement the monitoring system

# Operational framework - 2

## AEGIS Advisory Committee

1. Comment on draft generic standards
2. Approve template
3. Comment on minimum standards (ensure “equal treatment” between crops)

## ECPGR Steering Committee:

1. Approve generic and technical standards
2. Approve reports
3. Decide on issues / capacity building recommendations

# Operational framework - 3

## Associate Members:

1. Adopt standards,
2. Prepare genebank manual,
3. Keep records,
4. Write reports, and
5. Adopt monitoring system

# The way forward AQUAS -

## WGs

- Adopt and use the final template for a genebank manual (Associate members)
- Comment on **generic technical standards** (**Early 2011**)
- Initiation of process to develop **crop specific technical minimum standards**:
  - a. **Collecting / Acquisition**
  - b. **Regeneration / Propagation**
  - c. **Drying and other preparatory steps**
  - d. **Storage / field genebank maintenance**
  - e. **Seed quality and viability monitoring**
  - f. **Distribution**
  - g. **Characterization**

# Template for an operational genebank manual

## From AQUAS document:

Based on a template of an operational genebank manual, provided by the Secretariat in collaboration with the genebanks, commented by the NCGs and approved by the AEGIS Advisory Committee, **each associate member of AEGIS will prepare a manual** that contains descriptions of the routine genebank management procedures and practices and will make it available on-line (within one year from signing the Associate Membership Agreement)

# Five conservation objectives

1. Germplasm acquisition
2. Ensuring security
3. Germplasm maintenance
  - a) Maintaining viability
  - b) Maintaining genetic integrity
  - c) Ensuring availability
4. Providing information

# 1. Germplasm Acquisition

1.1 Germplasm acquisition and  
accessioning

1.2 Germplasm collecting

## 2. Ensuring Security

### 2.1 Physical Security

- Safety Duplication
- Structure
- Security equipment
- Institutional and personnel security
- Contingency Plans

# 3. Germplasm maintenance

(seed, in vitro culture, cryopreservation, field genebanks)

## 3.1 Maintenance of Viability

- Initial seed viability
- Seed viability Monitoring
- Seed Storage Conditions

## 3. Germplasm maintenance

### 3.2 Maintaining genetic integrity

- Seed containers and sample size
- Pollination Control
- Regeneration Environment and procedures
- Seed processing procedures
- Genetically modified material

## 3. Germplasm maintenance

### 3.3 Ensuring Availability of Germplasm

- Policy Aspects
- Seed/Germplasm Stock Aspects
- Health Aspects
- Germplasm Supply

## 4. Providing Information

4.1 Genebank Documentation System

4.2 Information Exchange

# Generic genebank standards

# Revision of FAO-IPGRI Genebank Standards

- FAO Commission on Genetic Resources for Food and Agriculture requested at its 12th meeting a revision of the Genebank Standards
- Genebank Standards were published in 1994
- A number of technical and political changes require a revision
- State of the World report II highlights these changes
- An agreed process for updating the standards – Draft will be circulated to ECPGR in January 2011?

# Table of contents of revised Genebank Standards

- Preamble
- Introduction
- Underlying principles
- Standards for:
  - Acquisition
  - Storage conditions
  - Viability monitoring
  - Regeneration
  - Characterization
  - Documentation
  - Distribution
  - Safety duplication
  - Security/personnel
- Annexes



# Genebank Standards - Agreed principles

- No distinction between “preferred” and “acceptable” standards
- One set of overall standards, defined as “targets”, and voluntary in nature

# Crop specific technical standards

# Minimum crop standards

Working Groups are invited to initiate process to develop **crop specific technical minimum standards:**

- **Collecting / Acquisition**
- **Regeneration / Propagation**
- **Drying and other preparatory steps**
- **Storage / field genebank maintenance**
- **Seed quality and viability monitoring**
- **Distribution**
- **Characterization**

# Status of crop standards

## Allium (vegetatively prop.)

- Field maintenance, in vitro culture, cryopreservation, virus elimination (AEGIS progress report, July 2008)

## Avena

- Collecting, conservation, viability testing, regeneration and multiplication, characterization/evaluation, distribution (draft in AEGIS progress report July 2008)
- Task force established in October 2010 to draft protocols on regeneration of wild accessions

## Beta

- Seed increase protocol (GENRES project 1996)
- Discussion on quality concept (Report of second meeting, Bologna 2002)
- Country protocols of seed regeneration guidelines: ECPGR web site

# Status of crop standards

## Brassica

- The summary of present practices and the draft minimum standards (AEGIS progress report July 2008)

## Cucurbits

- Regeneration guidelines (First meeting, Plovdiv 2005) – updated technical guidelines in preparation

## Forages

- A protocol of guidelines for the regeneration of accessions in seed collections of the main perennial forage grasses and legumes of temperate grasslands (Report of Sixth meeting, 1997)
- Description of the regeneration standards used for forage species (Preferred/acceptable) (Report of Ninth meeting, Piestany, 2007)

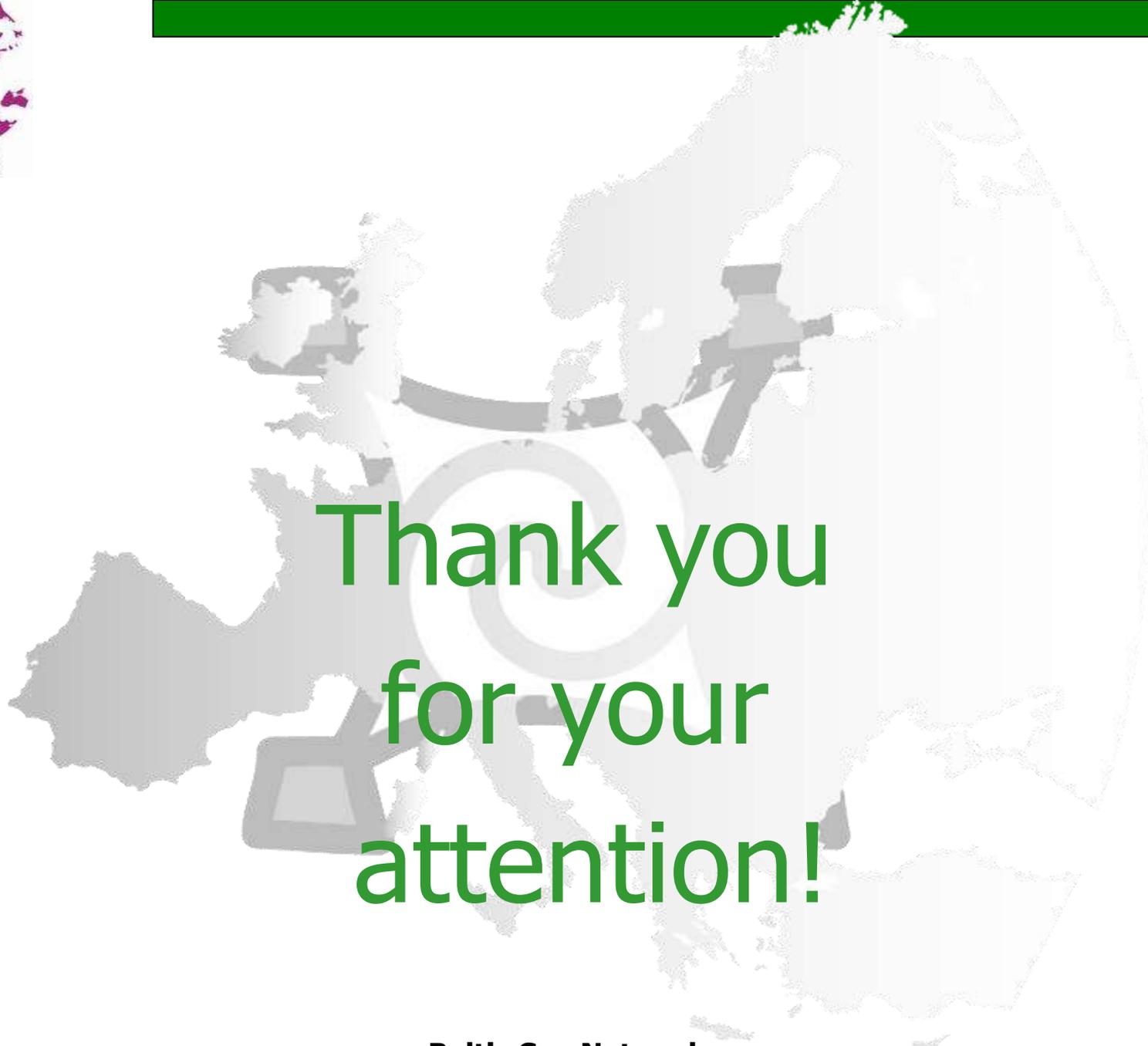
# Status of crop standards

## Prunus (Cherry)

- Minimum standards (Aegis progress report July 2008 and Report of Eighth Meeting, Forli, September 2010 – summary in preparation)

## Solanaceae

- information on seed management of each partner is available and will be updated regularly (ad hoc meeting held in Bari, Italy, September 2004).
- Minimum protocols on seed regeneration and seed storage have been harmonized and agreed by the Working Group members (ad hoc meeting held in Bari, Italy, September 2004).



Thank you  
for your  
attention!