Plant genetic resources conservation in Europe: the AEGIS Experience

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ECPGR aims at conserving and facilitating the use of plant genetic diversity in Europe as a cooperative effort

- Countries
  - own the programme
  - contribute funds and implement activities

- Secretariat ensures coordination
National, Sub-regional and Regional Programmes in Europe collaboratively, rationally and effectively conserve *ex situ* and *in situ* PGRFA, provide access and increase their utilization
ECPGR – achievements (1980 – 2013)

• Working Group activities
• Collaborative projects
• EURISCO (European *ex situ* Internet catalogue)
• AEGIS (A European Genebank Integrated System)
Background – Ex situ conservation in Europe

- 600 germplasm collections/genebanks in Europe (WIEWS)
- > 1.7 million accessions (SOW II, 2010)
- 35-50% unique accessions
- Significant differences in quality of conservation
- Accessions for a given crop are distributed across several countries
12 000 *Brassica oleracea* accessions in Europe
(source: EURISCO)
23 000 *Malus domestica* accessions in Europe
(source: EURISCO)

- **Switzerland**: 38%
- **Austria**: 10%
- **Czech Republic**: 5%
- **Spain**: 7%
- **UK**: 9%
- **Ukraine**: 8%
- **Other 13**: 23%

Decentralized collections
Annex I crops (35 food crops, incl. Wheat, Beans, Apple):
Standard Material Transfer Agreement of the
International Treaty on PGRFA (Multilateral System)

Non-Annex I crops (e.g. Soybean, Tomato, Pear):
Bilateral arrangements as per Convention on Biodiversity
# Wild brassicas as sources of agronomic traits

<table>
<thead>
<tr>
<th>Trait</th>
<th>Number of accessions</th>
<th>Available through SMTA</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B. hilarionis</strong> Resistance to pod shattering</td>
<td>7</td>
<td>2</td>
<td>28 %</td>
</tr>
<tr>
<td><strong>B. incana</strong> Resistance to Verticillium wilt and white fly</td>
<td>373</td>
<td>7</td>
<td>2 %</td>
</tr>
<tr>
<td><strong>B. macrocarpa</strong> Resistance to pod shattering</td>
<td>70</td>
<td>12</td>
<td>17 %</td>
</tr>
<tr>
<td><strong>B. montana</strong> Resistance to white fly</td>
<td>118</td>
<td>14</td>
<td>12 %</td>
</tr>
<tr>
<td><strong>B. villosa</strong> Anti-oxidant glucosinolates, resistance to flea beetles and white fly</td>
<td>85</td>
<td>9</td>
<td>10 %</td>
</tr>
</tbody>
</table>

Sources: Happstadius et al. 2013; Maggioni et al. 2014; Mithen 2014; Mithen and Herron 1991; Palaniswamy and Bodnaryk 1981; Pelgrom et al. 2015; Vosman et al. 2015; Warwick 1993
Genus *Patellifolia*

- Source of resistance genes (beet cyst nematode) for sugar beet
- Ca. 60 accessions in European genebanks
- Taxonomy is still confused
- Need for reference material and certain identification to evaluate the distribution of genetic diversity
Regeneration

Variability of climatic conditions in Europe:
ideal to share tasks

Brassica oleracea subsp. capitatoides © L. Maggioni
Quality standards: variability and cross-checking

Seed regeneration

- Vector used for insect-pollinated, wild species
- FAO: no standard

<table>
<thead>
<tr>
<th>Institute</th>
<th>Lettuce</th>
<th>Spinach</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGR-IPGR</td>
<td>not specified</td>
<td></td>
</tr>
<tr>
<td>CZE-CRI</td>
<td>bees</td>
<td></td>
</tr>
<tr>
<td>DEU-IPK</td>
<td>solitary bees, wild insects</td>
<td></td>
</tr>
<tr>
<td>GBR-WGRU</td>
<td>no vector</td>
<td></td>
</tr>
<tr>
<td>HUN-RCAT</td>
<td>no vector</td>
<td></td>
</tr>
<tr>
<td>ISR-IGB</td>
<td>bees</td>
<td></td>
</tr>
<tr>
<td>ISR-IOE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLD-CGN</td>
<td>flies</td>
<td></td>
</tr>
<tr>
<td>SVN-KIS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Centre for Genetic Resources, The Netherlands (CGN)
AEGIS objective:

Conserving in a collaborative way and at agreed quality standards, the genetically unique and important accessions for Europe of all crops and making them available for breeding and research through SMTAs
Key components of AEGIS

- MoU (Memorandum of Understanding)
- European Collection
- AQUAS (AEGIS Quality System)
Network of services

Identify expertise across Europe and provision of services, such as:

- Cryopreservation units
- Safety-duplication sites (e.g. national genebanks; Svalbard)
- Multiplication fields at different locations (environment!)
- Taxonomy expertise
- Sequencing facilities and bioinformatics
- Genotyping / Phenotyping facilities
- Documentation (i.e. EURISCO; Crop Portals)
- Capacity building
AEGIS membership status

http://aegis.cgiar.org/

1. **Albania** (06 May 2009) - Associate Members
2. **Austria** (05 December 2012) - Associate Members
3. **Azerbaijan** (16 July 2009) - Associate Members
4. **Belarus** (02 November 2011) - Associate Members
5. **Belgium** (01 June 2012) - Associate Members
6. **Bosnia and Herzegovina** (19 May 2010)
7. **Bulgaria** (02 December 2009) - Associate Members
8. **Croatia** (02 December 2009) - Associate Members
9. **Cyprus** (15 September 2012) - Associate Members
10. **Czech Republic** (23 July 2009) - Associate Members
11. **Denmark** (22 February 2010) - Associate Members
12. **Estonia** (22 May 2009) - Associate Members
13. **Finland** (02 December 2009) - Associate Members
14. **Georgia** (18 May 2009) - Associate Members
15. **Germany** (05 November 2009) - Associate Members
16. **Hungary** (22 November 2011) - Associate Members
17. **Iceland** (22 October 2010) - Associate Members
18. **Ireland** (22 July 2009)
19. **Italy** (03 March 2014)
20. **Latvia** (01 June 2012)
21. **Lithuania** (12 October 2010)
22. **Montenegro** (16 December 2010)
23. **Netherlands** (28 May 2009) - Associate Members
24. **Norway** (17 August 2009) - Associate Members
25. **Poland** (17 May 2010) - Associate Members
26. **Portugal** (20 November 2009)
27. **Romania** (14 April 2010) - Associate Members
28. **Slovakia** (17 June 2009) - Associate Members
29. **Slovenia** (21 September 2009) - Associate Members
30. **Sweden** (31 May 2011) - Associate Members
31. **Switzerland** (27 July 2009) - Associate Members
32. **Turkey** (14 November 2011) - Associate Members
33. **Ukraine** (30 April 2009)
34. **United Kingdom** (18 June 2010) - Associate Members

**34 Members**

**58 Associate Members’ Agreements**
The European Collection today

25 291 accessions

Germany: 7904
The Netherlands: 5862
Switzerland: 4838
UK: 1659
Czech Republic: 1222
Croatia: 90
Albania: 8
Concluding remarks

- The AEGIS principles have been unanimously endorsed by the technical representatives (National Coordinators)
- Users (e.g. breeders) easily see the benefits and recommend implementation of the system
- At the Ministerial level, sometimes there is fear of increasing costs and long-term commitment
- Genebanks do not always perceive a benefit (increasing efficiency of the system requires local adjustments and investments)
- Progress is dependent on good coordination at national level of all the stakeholders
Too early to say if AEGIS will be successful

- Hopefully progress will lead to:
  - Better conservation (coverage, efficiency, quality, safety)
  - Better knowledge of the material (documentation system, characterization)
  - Better availability (policy, speed, quality)

= Better collaboration and sharing of responsibilities
Thank you for your attention!