Europe’s crop wild relative diversity: from conservation planning to conservation action

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ENHANCED GENEPOOL UTILIZATION – Capturing wild relative and landrace diversity for crop improvement
16–20 June 2014, NIAB Innovation Farm, Cambridge, United Kingdom
IN THIS PRESENTATION.........

1. WHY? Europe’s valuable CWR diversity
2. WHICH? Not all CWR have equal value – which should we conserve?
3. WHERE? Regional distribution – identifying target populations
4. HOW? An integrated European CWR conservation strategy
1. EUROPE’S VALUABLE CWR DIVERSITY

- Europe is an important centre of diversity of many crops and their wild relatives and these CWR are potential genetic resources for crop improvement and food security

- **Food crops with significant CWR diversity native to region** include wheat (*Triticum aestivum* L.), barley (*Hordeum vulgare* L.), oat (*Avena sativa* L.), sugar beet (*Beta vulgaris* L.), cabbage and other brassicas (*Brassica* L. spp. and allied genera), onion and other alliums (*Allium* L. spp.), asparagus (*Asparagus officinalis* L.), lettuce (*Lactuca sativa* L.) and apple (*Malus domestica* L.)

- **Forage and fodder crops with CWR native to Europe** include annual meadow grass (*Festuca pratensis*), white clover (*Trifolium repens*), alfalfa (*Medicago sativa* L.) and common vetch (*Vicia sativa* L.)
1. EUROPE’S VALUABLE CWR DIVERSITY cont’d

- Other crops of socio-economic importance with native wild relatives in the region
  - Forestry species such as *Abies alba* Mill., *Populus nigra* L. and *Quercus ilex* L.
  - Ornamentals such as species of *Dianthus* L., *Euphorbia* L., *Geranium* L. and *Primula* L.
  - Medicinal and aromatic plants such as species of *Anemone* L., *Campanula* L., *Helianthemum* Mill., *Orchis* L. and *Verbascum*
  - Herb, spice, environmental and industrial crops
Today, agricultural production is challenged by climate change. Although food production in Europe is likely to be less affected by climate change in the first half of the 21st century than some other regions of the world, an increase in extreme weather events due to climate change can have far-reaching impacts.

An extreme climate event in Europe in 2003 when temperatures were up to 6C above long-term averages and rainfall shortages up to 300mm (Trenberth et al., 2007) had some major impacts on crop production (Easterling et al., 2007) resulting in uninsured economic losses in the EU agriculture sector of some €13 billion (Sénat, 2004).
2. WHICH CWR SHOULD WE CONSERVE?

The 23 human food crops or crop groups with an average annual production value of more than US$500 million in Europe over the period 2002–2011 that have significant native wild relative taxonomic diversity in the region.
Average annual contributions of human food crops/crop groups to dietary energy (kilocalories) per capita per day of 1.5% or more over the period 2000–2009 in Europe. Data source: FAO (2014)
2. WHICH CWR SHOULD WE CONSERVE cont’d?

- 23 priority human crops/crop groups
- 35 genera containing 568 species
  - 150 species + 47 subspecies of greatest use potential
  - 42 more distantly related species threatened or Near Threatened
- 192 high priority species
- 19 species threatened or NT (12 globally)
- 30 endemic to Europe
2. WHICH CWR SHOULD WE CONSERVE cont’d?

Red List status of 192 high priority European CWR:

- LC (57)
- DD (36)
- NA (2)
- VU (17)
- EN (17)
- CR (9)
- NT (16)
- NC (1)

- Increasing: 2.3%
- Decreasing: 10.9%
- Stable: 38.7%
- Unknown: 48.2%
3. REGIONAL CWR DISTRIBUTION

31 countries in Europe contain 20 or more high priority CWR

Highest taxonomic diversity in Spain, Italy and Greece
3. IDENTIFYING TARGET POPULATIONS

At least 94 (49%) of the high priority species occur in PAs
Accessions of European origin of 91 (47%) of the high priority CWR species related to 16 crops/crop groups are represented in European collections (data source: EURISCO, 2014)

- 24 species: >30
- 19 species: 10–29
- 48 species: ≤8
4. AN INTEGRATED EUROPEAN CWR CONSERVATION STRATEGY CONCEPT

www.pgrsecure.org/documents/Concept.pdf

Maxted et al., 2013
A clear EU policy on CWR conservation (with buy-in from national PGR programmes) (e.g., a specific EU Directive on PGRFA to protect MAWPs in a coordinated way within existing European level biodiversity protection infrastructures such as the EU Habitats Directive)

Address the issue of responsibility for CWR conservation at national and EU levels (agricultural/environmental sectors)

Resources for monitoring and managing in situ CWR populations and for collecting and managing CWR germplasm ex situ

Coordination of the integrated European CWR conservation strategy
1. Europe is an important centre of diversity of many crops and their wild relatives, and these CWR are potential genetic resources for crop improvement.

2. Europe’s CWR diversity is an important resource for the maintenance of food security and for safeguarding the substantial economic gains to Europe through crop production in the region.

3. Recent advances in our understanding of CWR diversity in the region, as well as in planning for their complementary conservation, provides a solid foundation for the development of a strategic approach to their conservation in Europe based on a range of commonly agreed and widely tested scientific concepts and techniques.
4. Achieving effective conservation and utilization of European CWR diversity will require a coherent, regionally coordinated policy and the appropriate resources to fund their conservation, characterization and evaluation.

5. To achieve sustainable conservation of CWR and maximize their sustainable exploitation in Europe, there is an imperative to develop an EU-led policy to harmonize their conservation, characterization and evaluation with existing biodiversity conservation and agricultural initiatives, and to develop new initiatives where necessary.
IN CONCLUSION..........

1. **WHY?** Europe’s valuable CWR diversity ✓
2. **WHICH?** Not all CWR have equal value – which should we conserve? ✓
3. **WHERE?** Regional distribution – identifying target populations ✓
4. **HOW?** An integrated European CWR conservation strategy ✓
5. **WHEN?** Action at national, regional and global levels is needed now!
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Thanks for your attention!