



## *PGR Secure International Conference*

Enhanced Genepool Utilization - Capturing wild relative and landrace diversity for crop improvement  
Cambridge, 16-20 June 2014

# National Strategies for the Conservation of CWR

J.M. Iriondo, S.P. Kell, H. Fitzgerald, V. Negri, J. Magos Brehm & N. Maxted



# Acknowledgements

---

- ▶ Hannah Fielder, University of Birmingham, UK
- ▶ Jade Phillips, University of Birmingham, UK
- ▶ Juozas Labokas, Nature Research Centre, Vilnius, Lithuania
- ▶ Luisa Rubio, Universidad Rey Juan Carlos, Spain
- ▶ Sarah Sensen, Federal Office for Agriculture and Food (BLE), Germany
- ▶ Nigel Taylor, University of Birmingham, UK



# Aims of this presentation

---

- ▶ Focus and methodologies
- ▶ Progress in national CWR conservation
- ▶ Overview of results
- ▶ Limitations
- ▶ Challenges and future directions



# National strategies

---

- ▶ Focus on national priorities concerning conservation and management of CWR
- ▶ Developed and implemented by competent national administration

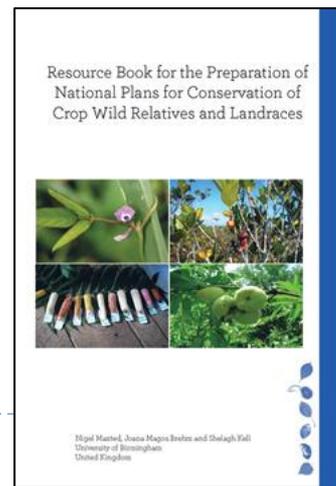
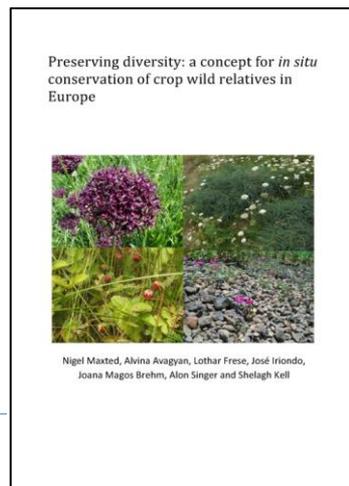


# Methodologies

---

## ▶ Various references available:

- ▶ AEGRO project: The CWR *In Situ* Strategy Helpdesk (<http://aegro.jki.bund.de/aegro/index.php?id=188>)
- ▶ FAO: Resource Book for the Preparation of National Plans for Conservation of Crop Wild Relatives and Landraces
- ▶ ECPGR: A concept for *in situ* conservation of crop wild relatives in Europe
- ▶ PGR Secure Helpdesk (<http://www.pgrsecure.org/>)





Steps in the development of  
National Strategy for CWR

National checklist



Prioritization for  
conservation



Characterization of  
priority taxa



*In situ* and *ex situ* gap  
analysis



Conservation goals



Conservation actions of  
national & regional  
MAWPs

# Progress in national CWR conservation

---

- ▶ Symposium 'Towards the establishment of genetic reserves for crop wild relatives and landraces in Europe' (AEGRO), Funchal (2010).



- ▶ Subsequently updated and maintained at PGR Secure website:

- ▶ [http://www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/Progress\\_national\\_CWR\\_and\\_LR\\_conservation\\_Europe.pdf](http://www.pgrsecure.bham.ac.uk/sites/default/files/documents/helpdesk/Progress_national_CWR_and_LR_conservation_Europe.pdf)



# Progress in national CWR conservation

---

## ▶ 34 European countries

Progress	N° countries (%)
National checklist	34 (100%)
CWR priority taxa	18 (53%)
Threat assessment	17 (50%)
<i>In situ</i> / <i>Ex situ</i> gap analysis	8 (24%)
National strategy	13 (38%)
Information system	10 (29%)
<i>In situ</i> conservation actions	9 (26%)
<i>Ex situ</i> conservation actions	18 (53%)
Legislation	9 (26%)



# Progress in national CWR conservation

---

## ▶ 34 European countries

Progress	N° countries (%)
National checklist	34 (100%)
CWR priority taxa	18 (53%)
Threat assessment	17 (50%)
<i>In situ</i> / <i>Ex situ</i> gap analysis	8 (24%)
National strategy	13 (38%)
Information system	10 (29%)
<i>In situ</i> conservation actions	9 (26%)
<i>Ex situ</i> conservation actions	18 (53%)
Legislation	9 (26%)

## ▶ First overview

---



# Progress in national CWR conservation

---

## PGR Secure

- PGR Secure/ECPGR workshop: Palanga, Lithuania (2011)
  - Implementation plan for development of National Strategies (ECPGR *In Situ* and On-Farm Conservation Network and National Focal Points)
- Helpdesk available online ([www.pgrsecure.org/helpdesk](http://www.pgrsecure.org/helpdesk))
- Technical support and advice at in-country meetings



# Progress in national CWR conservation

---

## PGR Secure:

- ▶ Funding of cases studies: Finland, Italy, Spain and UK
  - ▶ <http://jukuri.mtt.fi/bitstream/handle/10024/481549/mttraportti121.pdf>
  - ▶ <http://pgrsecurSpain.weebly.com/>
  - ▶ <http://vnr.unipg.it/PGRSecure/>
- ▶ Albania, Azerbaijan, Belarus, Bulgaria, Cyprus, Czech Republic, Greece, Lithuania, Norway, Poland, Sweden, Turkey
  - ▶ Seed funding raised, discussions with stakeholder groups, national strategies on progress/developed



# Progress in national CWR conservation

---

Previous/parallel studies or initiatives:

- ▶ Africa: Benin
- ▶ America: Guatemala, Mexico, Perú, USA, Venezuela
- ▶ Asia: China, India, Jordan
- ▶ Europe: Germany, Hungary, Ireland, Portugal, Switzerland
- ▶ GEF project: Armenia, Bolivia, Madagascar, Sri Lanka and Uzbekistan



# National Checklist

---

- ▶ Different approaches
- ▶ Initial delimitation:
  - ▶ Select only native taxa (Cyprus, Germany, Jordan, Norway, Spain)
  - ▶ Naturalized species included (Czech Republic, Lithuania, Portugal, UK, USA)
  - ▶ Forestry species excluded (Spain)

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs



# Prioritization criteria

---

- ▶ CWR that are going to be actively managed
- ▶ General criteria:
  - ▶ Socio-economic importance
  - ▶ Threat status
  - ▶ Use potential in crop breeding
- ▶ Other criteria:
  - ▶ Distribution: (Lithuania, Portugal)
    - ▶ Native status (Czech Republic, Finland)
    - ▶ Centre of diversity in the country (Cyprus)
  - ▶ Population size (Lithuania)
  - ▶ Stakeholder priorities (Germany, Norway)
  - ▶ Use categories (Portugal, Spain, UK-England)

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs

# Modes of prioritization

---

## ▶ Italy:

1. Socio-economic importance + threat
2. Socio-economic importance + endemism
3. Socio-economic importance

## ▶ Finland:

1. All threatened taxa
2. Non-threatened taxa + socio-economic importance or endemism

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs



# Prioritization

Country	National CWR checklist	No. of priority CWR taxa
Cyprus	1722	178
Czech Republic	3443	238
Finland	1905	209
Germany	2874	84 (300)
Italy	7032	124 (+85+904)
Jordan	2005	100
Lithuania	1040	160
Norway	2535	204
Portugal	2262	20
Spain	941	580
UK-England	1471	148
USA	4600	821(+1435)



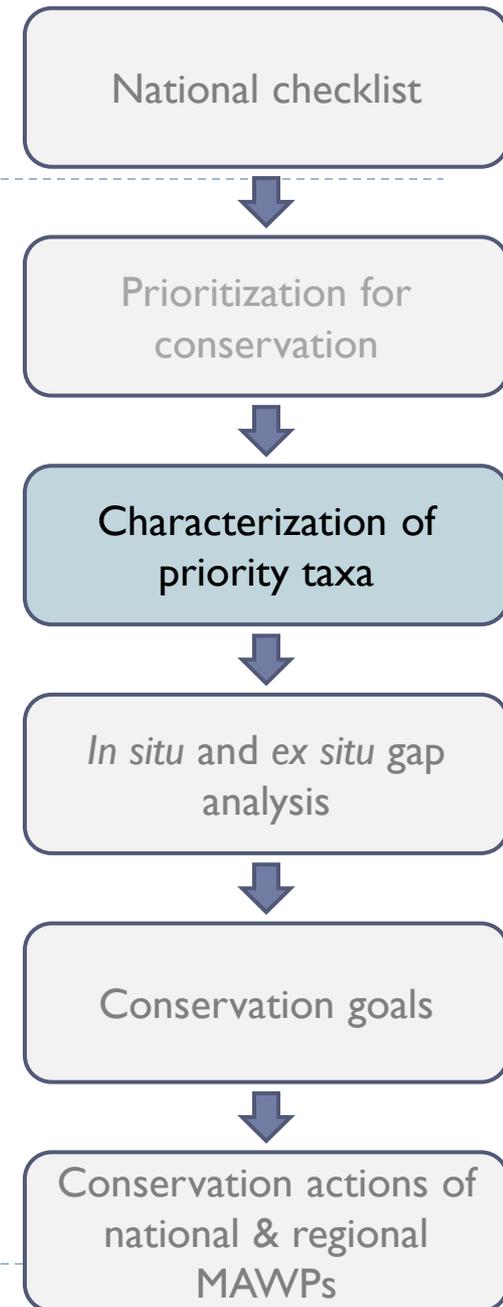
# Prioritization

Country	National CWR checklist	No. of priority CWR taxa
Cyprus	1722	178
Czech Republic	3443	238
Finland	1905	209
Germany	2874	84 (300)
Italy	7032	124 (+85+904)
Jordan	2005	100
Lithuania	1040	160
Norway	2535	204
Portugal	2262	20
Spain	941	580
UK-England	1471	148
USA	4600	821(+1435)



# Characterization of priority taxa

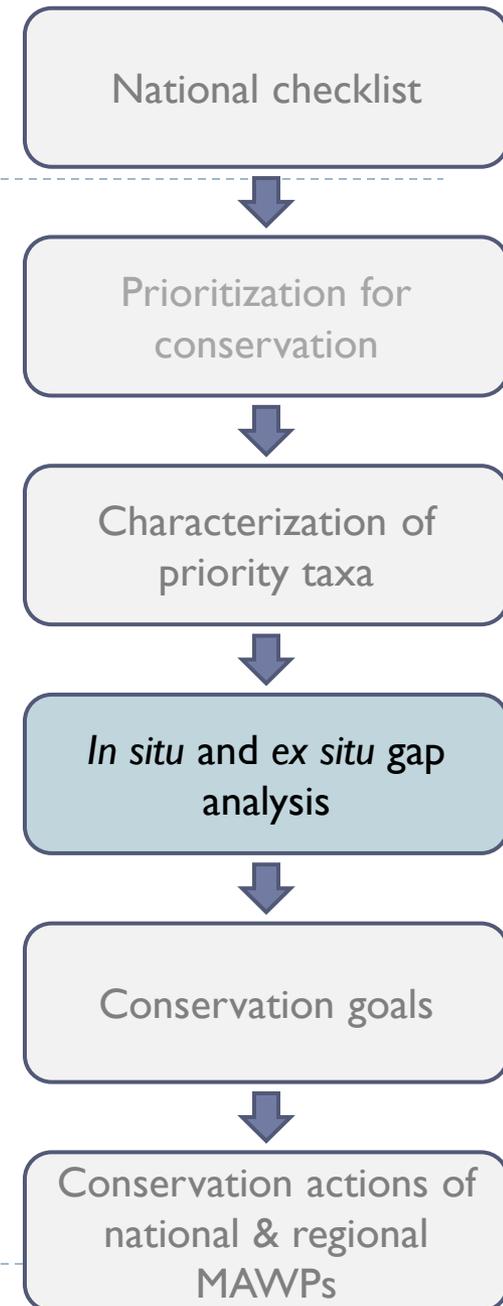
Country	% endemic	% threatened
Cyprus	3	9
Czech Republic	13	48
Germany	--	15
Jordan	10	32
Lithuania	1	16
Norway	--	12
Portugal	65	65
Spain	40	24
UK-England	0	12



# *In situ* conservation assessment

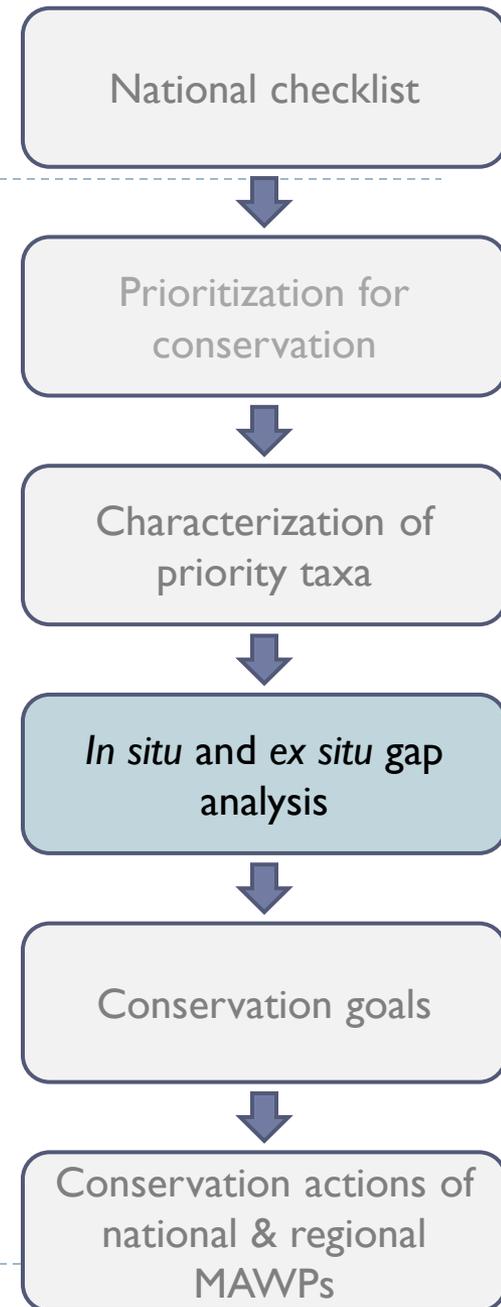
---

- ▶ Distribution data (1x1km, 10x10km)
  - ▶ Trade-off between data quantity and accuracy
- ▶ Overlay distribution data on layer of protected areas.
- ▶ Hotspot and complementarity analysis



# *In situ* conservation assessment

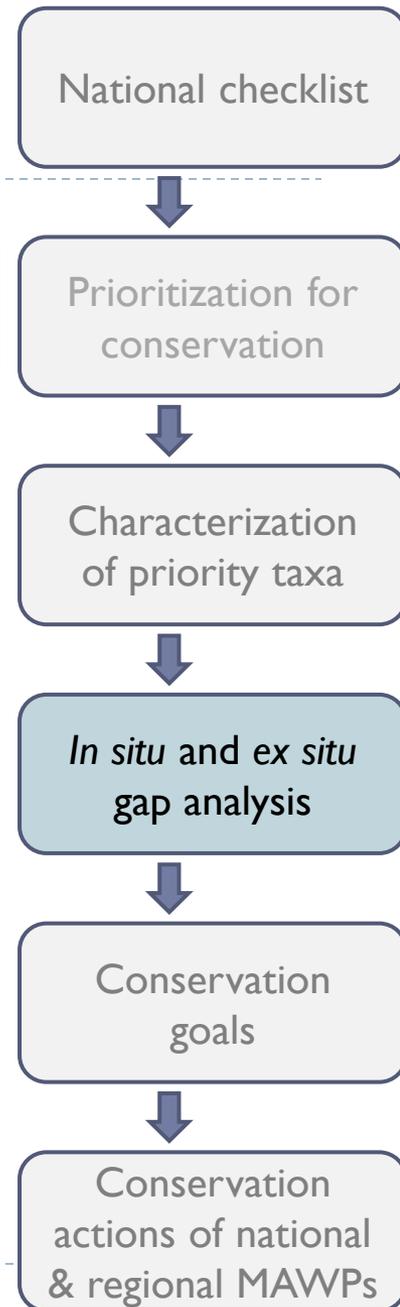
Country	Populations in protected areas	Other criteria
UK-England	35%	--
Lithuania	≈ 50%	--
Cyprus	--	67% taxa at least one population
Norway	--	88% taxa at least one population
Finland	--	33% taxa with over 60% populations in protected areas
Spain	---	37% taxa at least 75% of their ecogeographic units in protected areas



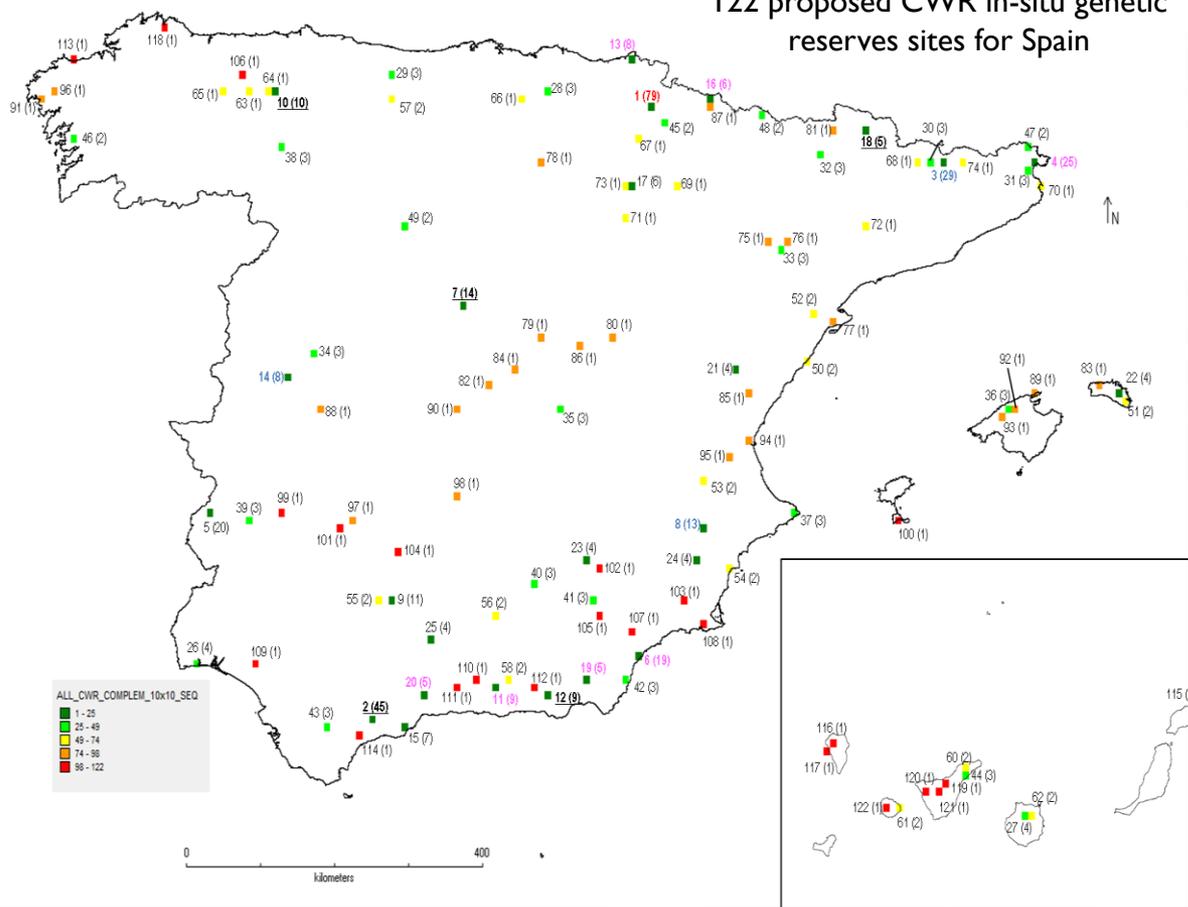
# *In situ* conservation assessment

Country	Complementarity sites	% of priority taxa covered by sites
Czech Republic	10	53
Finland	5	60
Spain	20	66
Cyprus	10	75
Portugal	10	90
Lithuania	30	90
UK-England	15	100
Jordan	16	100
Norway	19	100
Spain	122	100

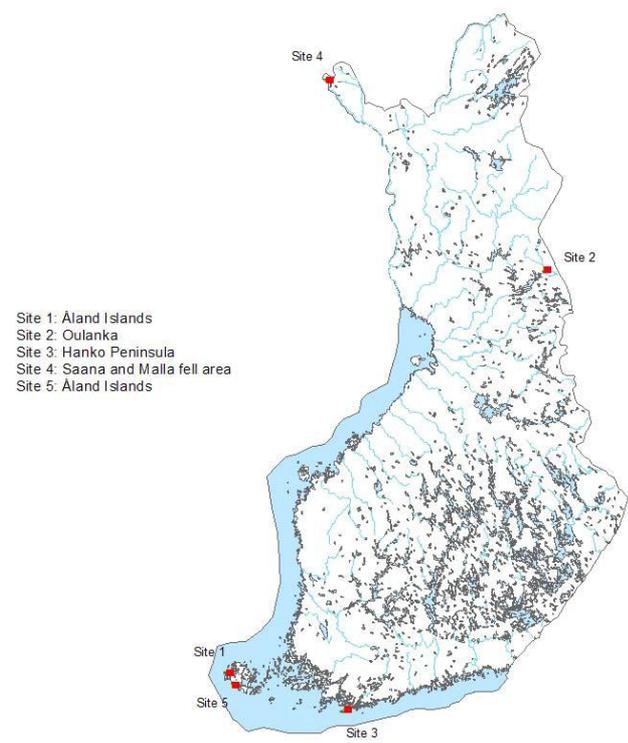
- Some of these sites fall outside protected areas



# 122 proposed CWR in-situ genetic reserves sites for Spain



# 5 proposed CWR in-situ genetic reserve sites for Finland



- Site 1: Åland Islands
- Site 2: Oulanka
- Site 3: Hanko Peninsula
- Site 4: Saana and Malla fell area
- Site 5: Åland Islands



## Ex situ conservation assessment of priority CWR

Country	% CWR taxa in genebanks	% CWR taxa > 5 populations
Cyprus	56	--
Czech Republic	27	--
Finland	27	3
Germany	≈ 90	--
Jordan	22	--
Lithuania	33	--
Portugal	15	--
Spain	71	23
UK-England	61	--
USA	55	18

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs

# Conservation goals

---

- ▶ Recovery plans of threatened CWR species
  - ▶ Establishment of genetic reserves in selected complementarity areas
  - ▶ Include priority CWR taxa in protected areas management plans
  - ▶ Attention to priority CWR taxa with low coverage in protected areas
  - ▶ Management of priority CWR populations outside protected areas.
  - ▶ Collection of underrepresented priority CWR taxa for *ex situ* conservation
- 

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs

# Conservation actions: *in situ*

---

## ▶ Examples of *active in situ* conservation

- *Triticum* in Ammiad, Eastern Galilee, Israel
- *Aegilops* in Ceylanpinar, southeast Turkey
- *Zea perennis* in the Sierra de Manantlan, Mexico
- *Citrus*, *Oryza* and *Alocasia* in Ngoc Hoi, Vietnam
- *Solanum* in Pisac Cusco, Peru
- Coffee in Yayu Forest Biosphere Reserve, Ethiopia

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

Conservation goals

Conservation actions of national & regional MAWPs

# Conservation actions: *in situ*

---

## ► Examples of *active in situ* conservation

- *Beta patula* in Madeira, Portugal
- Monitoring system for the *in situ* conservation of CWR in Brandenburg, Germany
- Securing the viability of wild grape in the old Rheinaue wetlands through targeted *in-situ*-management, Germany.
- Genetic reserve in Lizard Peninsula in Cornwall (in preparation), UK
- Network of genetic reserves for wild grapevine, *Allium*, *Beta*, some wild fruit plants, some grassland species (planned), Germany

National checklist

Prioritization for conservation

Characterization of priority taxa

*In situ* and *ex situ* gap analysis

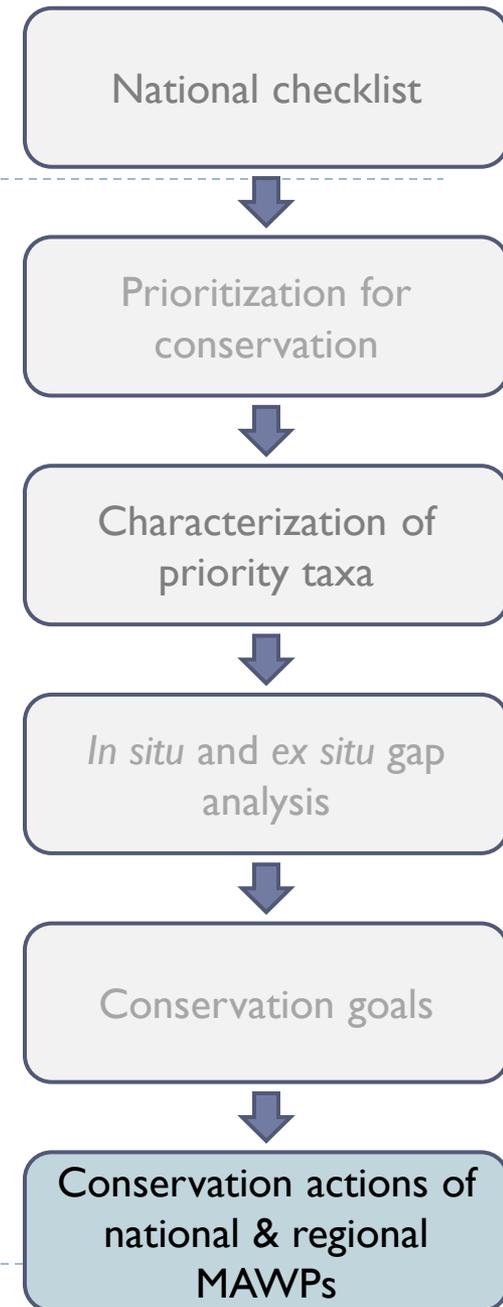
Conservation goals

Conservation actions of national & regional MAWPs

# Conservation actions

---

- ▶ *Ex situ* conservation
  - ▶ Botanical gardens and national PGR genebanks
  - ▶ Special CWR genebanks or collections (Germany, UK)
  - ▶ Global Crop Diversity Trust CWR project
- ▶ CWR species recovery plans.
- ▶ Specific CWR legislation (Czech Republic)



# Limitations

---

- ▶ Lack of accurate and systematic georeferenced data on CWR populations (Cyprus, Lithuania, Norway, Portugal, Spain)
- ▶ Lack of digitalised data (Cyprus, Jordan, Portugal)
- ▶ Harmonising different taxonomical treatments (Cyprus, UK).
- ▶ Difficulties in accessing to gene pool and taxon group concept information (but see:
  - ▶ Vincent, H. et al. (2013) A prioritized crop wild relative inventory to help underpin global food security. *Biological Conservation* 167: 265–275
  - ▶ Wiersema, J. Genetic relative concept, GRIN Taxonomy)

“Not having a clear accesible picture of what we have and where it is located”

---



# Challenges and future directions

---

## Concepts & methods:

- I. Conservation purpose: genetic diversity of adaptive value associated to CWR species
  - ▶ Target conservation unit: genetic provenance-species combination
  - ▶ Complementarity + ecogeographical approach



# Challenges and future directions: concepts and methods

---

## Concepts & methods:

2. Multi-species genetic reserves to maximise the efficiency of the conservation actions
  - ▶ Genetic provenance – plant community combination
3. Identifying genetic diversity of adaptive value
  - ▶ Ecogeographic approaches: Strengthen the correlation between ecogeographic units and genetic diversity of adaptive value
4. Assess the vulnerability of MAWPs or multi-species genetic reserves to climate change



# Challenges and future directions

---

## Policy:

1. Collaboration between agricultural, PGR, biodiversity, protected areas and academic sectors is necessary for the establishment of genetic reserves for CWR
2. Review policy and legal framework for CWR conservation in the country and provide appropriate funding
3. Coordination between *in situ* and *ex situ* approaches
4. Integration of CWR conservation data in the national PGR information infrastructure
5. Cooperative conservation efforts with neighboring countries and coordination with regional CWR strategy



