



National crop wild relative strategy conservation planning: a case study for the UK

Nigel Maxted, Maria Scholten, Rosalind Codd, Heli Fitzgerald, Ryoko Hirano,
Serene Hargreaves, Joe Osborne,
Joana Magos Brehm, Shelagh Kell and Brian Ford-Lloyd

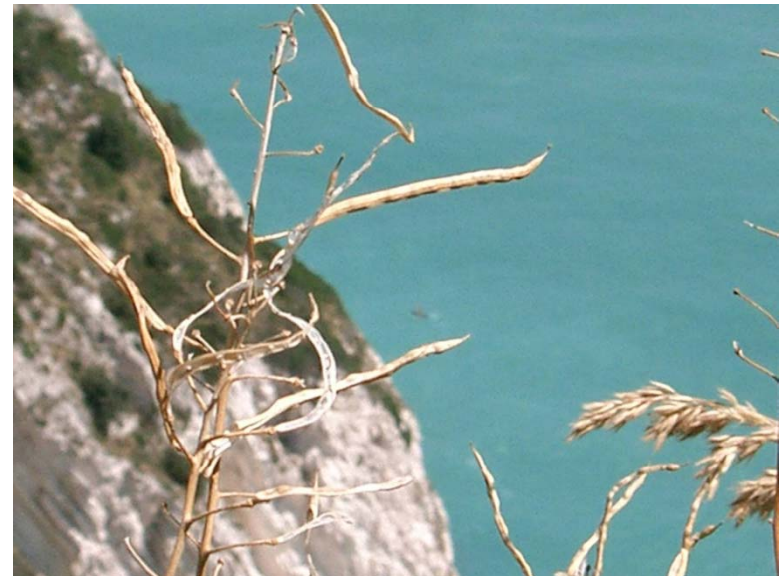


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Session objectives

- Alternative approaches to CWR conservation
- Steps toward a National CWR Strategy
 - Creating national CWR inventory
 - CWR Threat status
 - Current conservation actions
 - Priority sites for CWR conservation
 - CWR conservation action plans
 - Holistic CWR conservation
- PGR Secure: an opportunity for collaboration



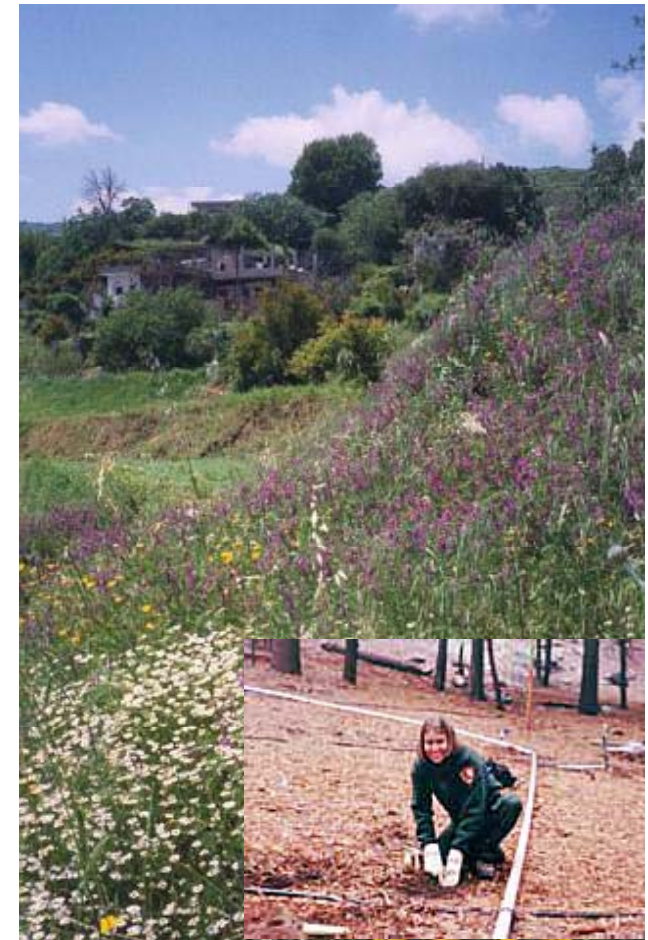
Approaches to establishing a CWR conservation strategy

- Numerous diverse approaches that result in genetically representative samples of CWR conserved
- Three basic diverse approaches:
 - Individual reserve manager
 - National / Regional
 - Global (FAO Global Strategy)
- Each concludes with CWR diversity being actively conserved in genetic reserves + safety backup held *ex situ*



Individual CWR Genetic Reserve: Bottom-up

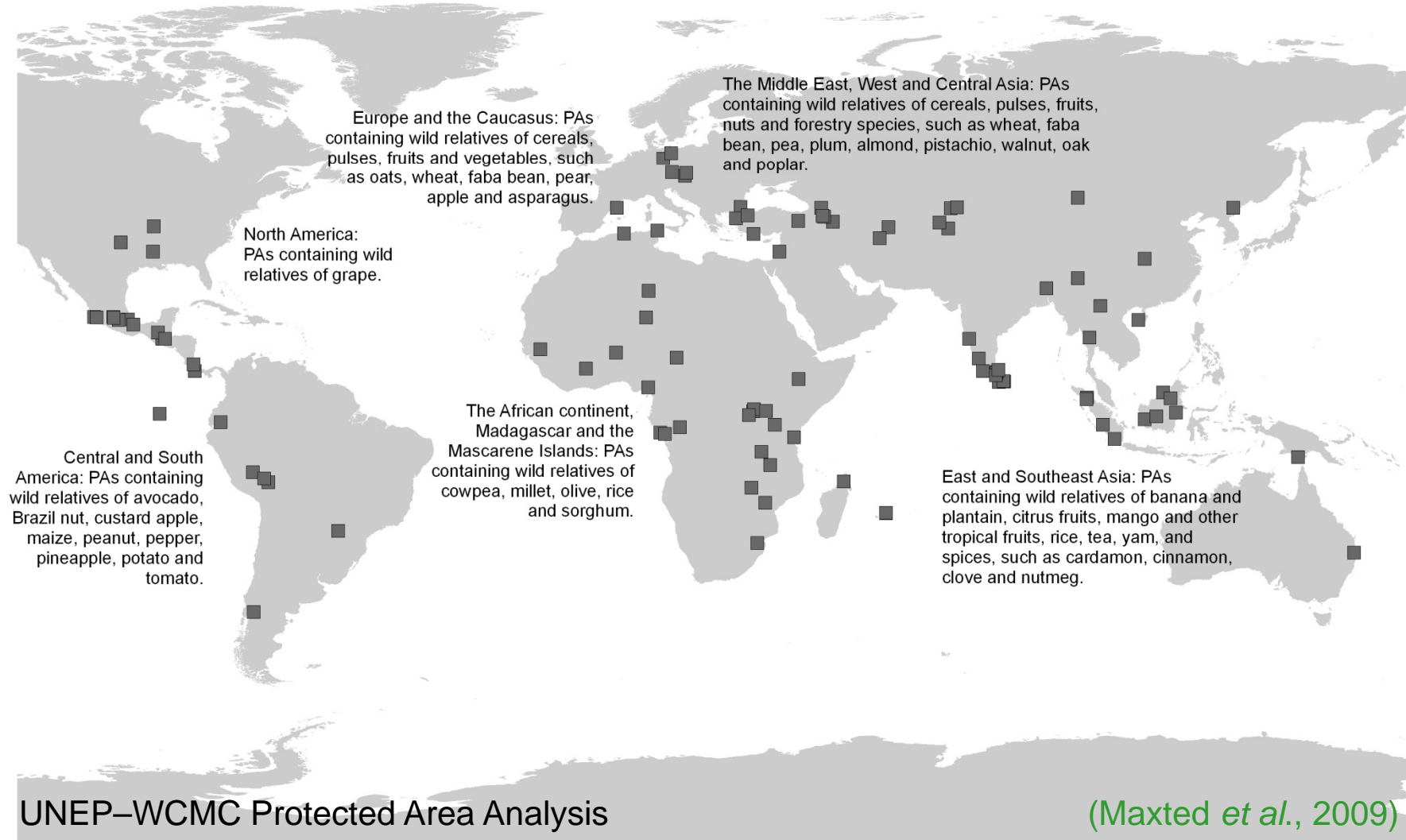
- CWR found widely in nature inside and outside of PA
- Each individual PA (where conservation is a focus) may not be included in national or global CWR networks
- Individual PA manager's involvement in CWR conservation
- Adapt the PA management plan to facilitate Genetic conservation of CWR diversity
- Publicize the presence of CWR species in the protected area
 - General public see PA role in helping ensure national wealth creation and food security, e.g. banana, coffee, rice in botanic gardens



Global CWR conservation strategy:

top down

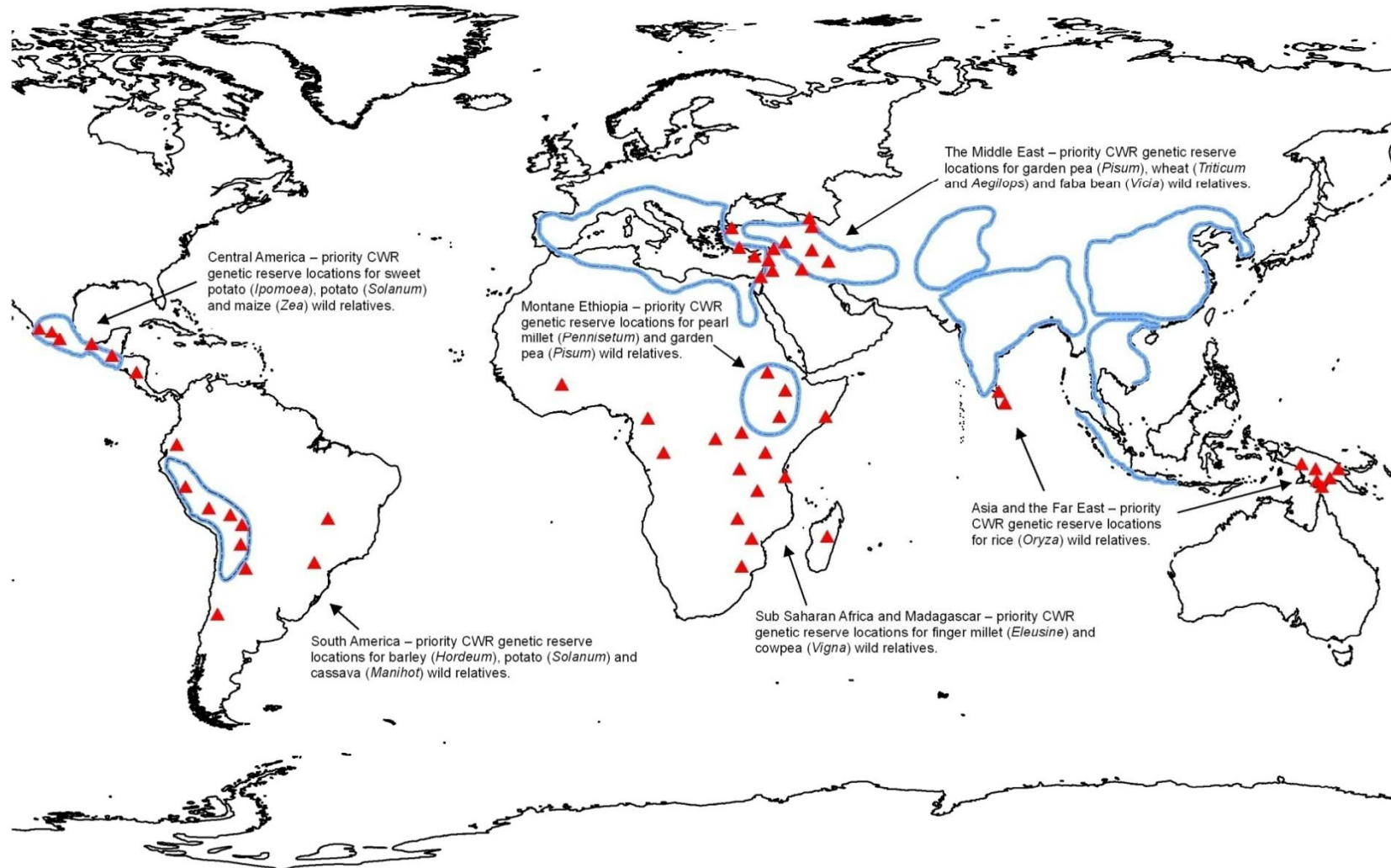
focus on existing protected areas



Global CWR conservation strategy:

top down

focus on 80 major and minor crops and $\pm 1,200$ priority CWRs

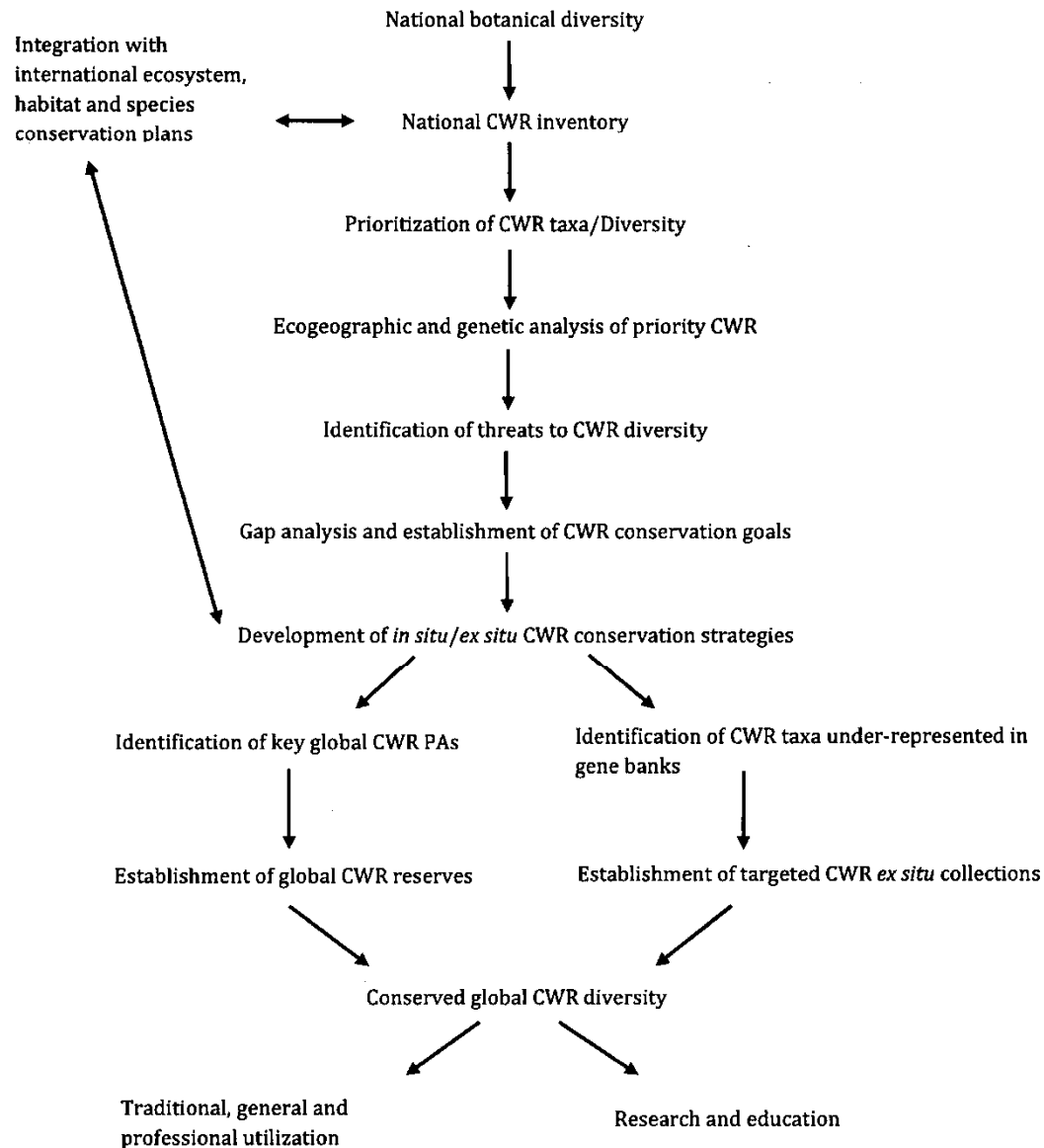


National CWR Strategies

- CWR are a unique national resource
- CWR are threatened
- Legislative requirement to conserve
- CWR by their nature require an integrated *in situ* / ex situ approach, best implemented via a National CWR Strategy
- No single method of generation



National CWR Strategy



- Focus on national CWR flora, objective to maximise taxonomic and genetic diversity of the country's CWR conserved
- National *in situ* / *ex situ* priorities and national PA network
- Genetic reserves established within existing national PA at priority sites
- Application in Ireland, Portugal, Switzerland, Germany, several Middle East Countries and the UK

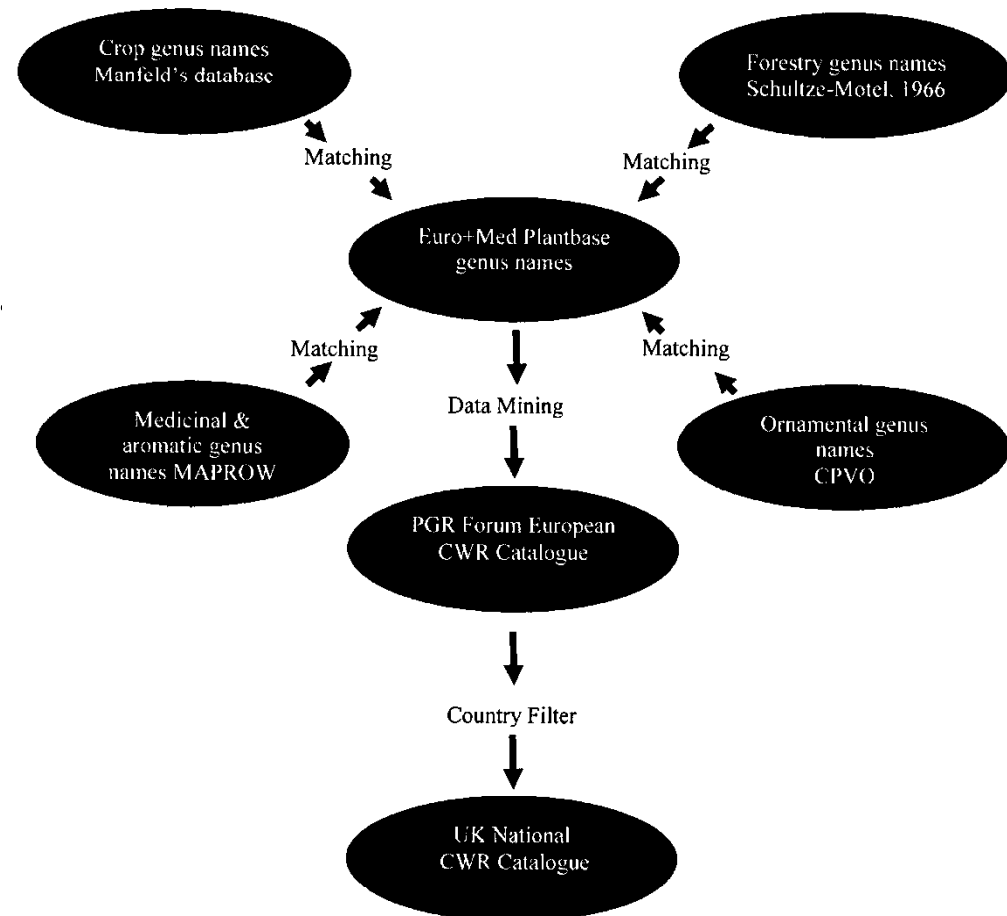
National / Regional Botanical Diversity

- Floristic checklists
 - Listed in Davis *et al.* (1986) and Frodin (2001)
 - Neighbouring country
 - Province (e.g. Flora Veracruz)
 - Broader region (e.g. Flora Mesoamericana)
 - For the UK - Stace (1997)
- Taxonomic checklist of country taxa



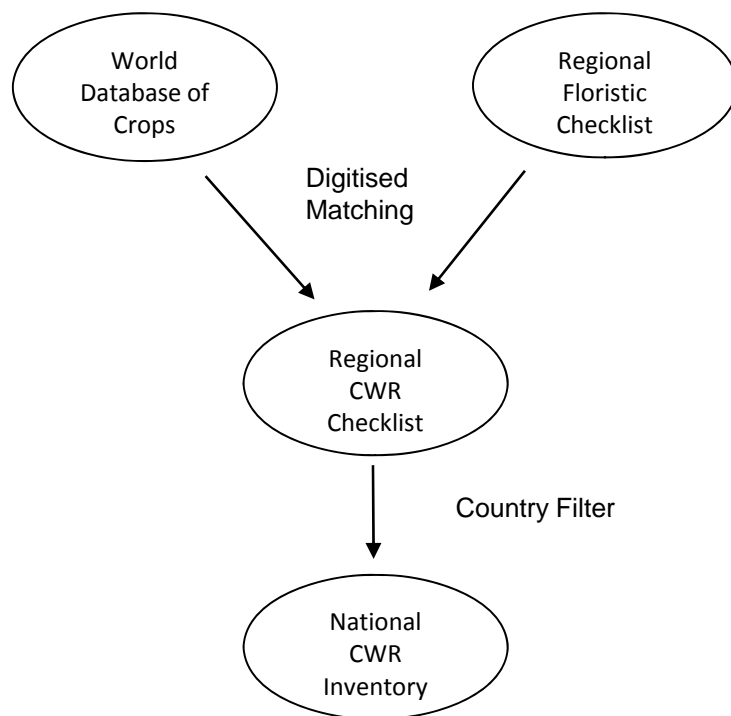
National / Regional CWR Inventory

- National floristic / taxonomic checklist
- National crop checklis
- Matching of genera
- Extraction (data mining) of CWR taxa
- Uses generic definition of CWR

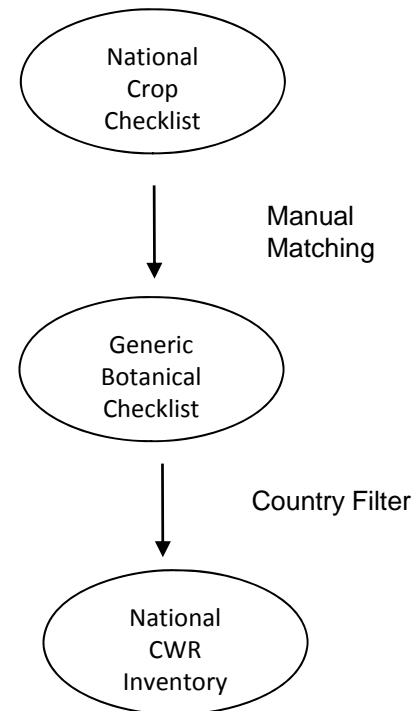


National CWR Inventory

‘Floristic route’ = Flora to crops to CWR inventory (semi-automated)



‘Monographic route’ = Crops to flora to CWR inventory (via workshop)



Prioritising CWR Taxa / Diversity

- Broad CWR definition with generic limit = relative large number of taxa (81% of Flora)
- Limited resources so need to focus on priority CWRs
 - current conservation status, socio-economic use, threat of genetic erosion, genetic distinctiveness, ecogeographic distribution, biological importance, cultural importance, cost, sustainability, legislation, ethical and aesthetic considerations, and priorities of the conservation agency
 - **economic value** (Mansfeld use categories)
 - **relative threat assessment** (IUCN Red List Criteria)



Example: UK CWR Prioritisation

2,300 UK plant species with 1,863 CWR using generic definition of CWR

- 300 food and agriculture CWR species
- 850 ornamentals CWR species
- 200 wild harvested CWR species
- 80 threatened CWR species

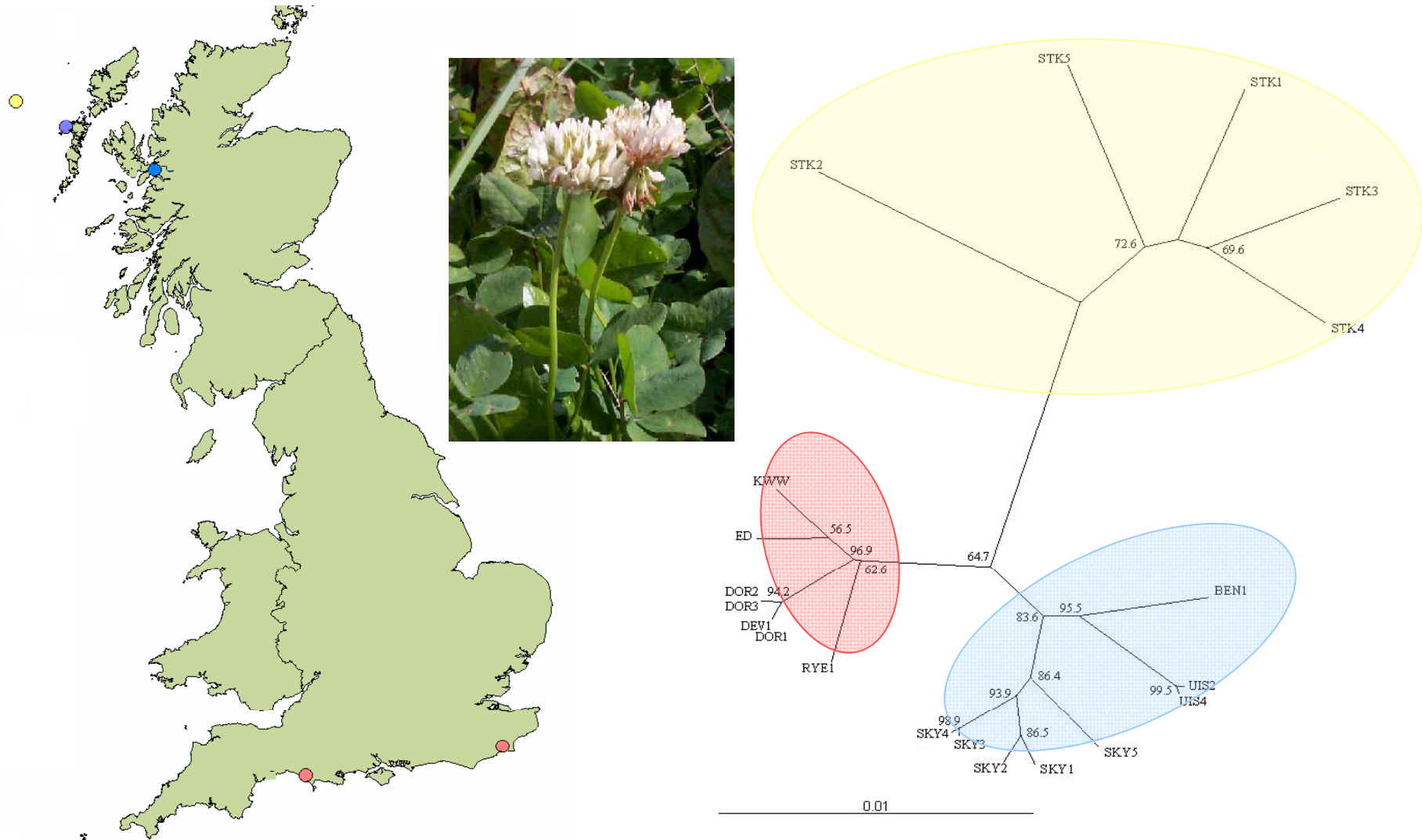


Ecogeographic and Genetic Analysis of Priority CWR

- Little genetic information available
- Employ proxy of ecogeography diversity, assume ecogeography = genetic diversity
- Ecogeographic data is taxonomic, ecological and geographic information associated with population provenance
- Ecogeographic survey of priority taxa to generate baseline data

Ecogeographic and Genetic Analysis?

Cluster analysis of wild *Trifolium repens* from St. Kilda and wild and landrace material from north western Scotland and southern England based on 408 AFLP markers (Hargreaves *et al.* 2008).



Genetic Gap Analysis Methodology

Comparison of natural *in situ* CWR diversity with diversity sampled and conserved *in situ* or *ex situ*

Step 1: Circumscription of target taxon and target area

Step 2: Natural *in situ* diversity

2a - Taxonomic Diversity Assessment

2b - Genetic Diversity Assessment

2c - Ecogeographic Diversity Assessment

2d - Threat Assessment

Step 3: Current conservation strategies

3a - *In situ* techniques

3b - *Ex situ* techniques

Step 4: Setting priorities for conservation action

4a - *In situ* conservation priorities

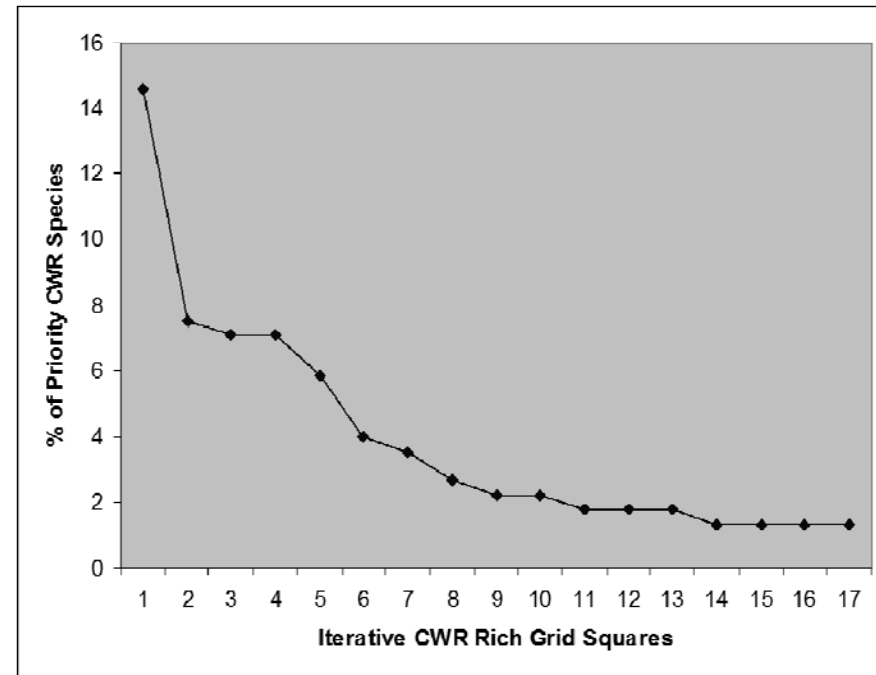
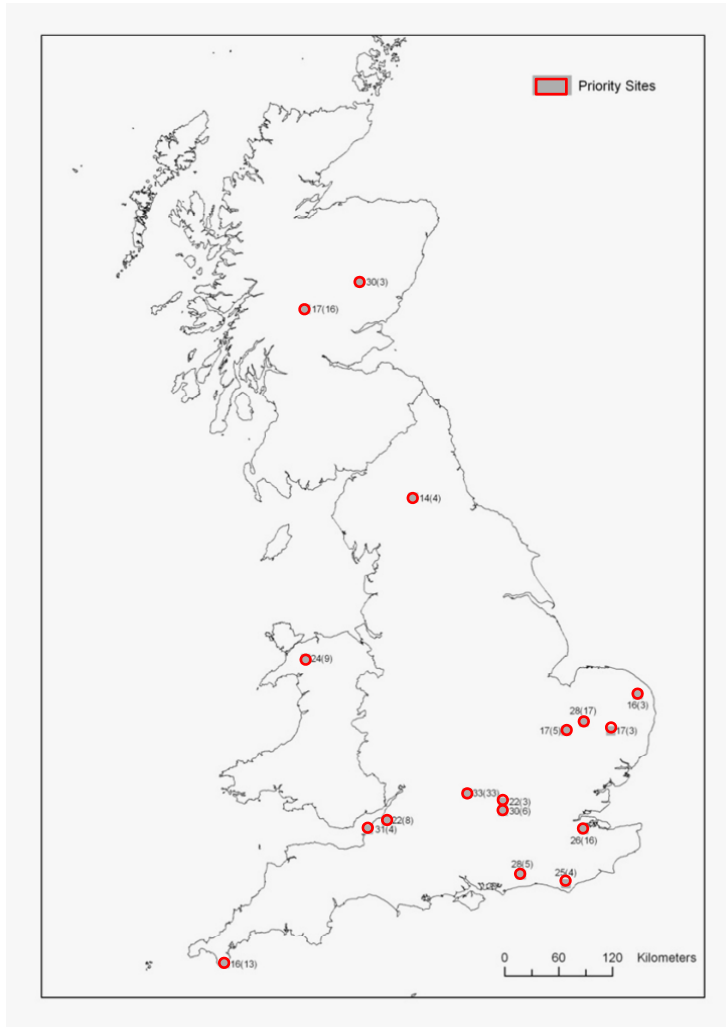
4b - *Ex situ* conservation priorities



CWR Gap Analysis

GENUS	SPECIES	SUBSP.	OCCUR	THREAT	in PA?
<i>Allium</i>	<i>oleraceum</i>		145	VU	
<i>Allium</i>	<i>sphaerocephalon</i>		2	VU	YES
<i>Apium</i>	<i>repens</i>		1	VU	YES
<i>Asparagus</i>	<i>officinalis</i>	<i>prostratus</i>	17	EN	YES
<i>Bromus</i>	<i>secalinus</i>		98	VU	
<i>Carum</i>	<i>carvi</i>		46	EN	
<i>Hordeum</i>	<i>marinum</i>		63	VU	YES
<i>Lactuca</i>	<i>saligna</i>		3	EN	YES
<i>Lolium</i>	<i>temulentum</i>		18	CR	
<i>Medicago</i>	<i>minima</i>		32	VU	YES
<i>Papaver</i>	<i>argemone</i>		342	VU	
<i>Poa</i>	<i>flexuosa</i>		6	VU	YES
<i>Poa</i>	<i>glauca</i>		33	VU	YES
<i>Pyrus</i>	<i>cordata</i>		4	VU	YES
<i>Scorzonera</i>	<i>humilis</i>		3	VU	
<i>Trifolium</i>	<i>bocconeii</i>		1	VU	YES
<i>Trifolium</i>	<i>incarnatum</i>	<i>molinerii</i>	4	VU	YES
<i>Trifolium</i>	<i>strictum</i>		4	VU	YES
<i>Valerianella</i>	<i>dentata</i>		168	EN	
<i>Valerianella</i>	<i>rimosa</i>		17	EN	YES
<i>Vicia</i>	<i>bithynica</i>		39	VU	
<i>Vicia</i>	<i>parviflora</i>		49	VU	YES

Important CWR Areas for the UK



17 10x10 km grid squares with 152 (67.3%) UK CWR species (69 sites for 100%) all have PAs

CWR conservation action plans

5. *Festuca arenaria* Osbeck

Family: Fabaceae/ Leguminosae
Synonyms: *F. juncifolia*, Chaub.
F. rubra ssp. *arenaria* (Osbeck) F. Aesch.
Common name: Rush- Leaved Fescue
Proposed red data category: CR B1ab(i)

1. Introduction

1.1. Ecogeography

Extensively rhizomatous perennial found on sand dunes and open sandy shingle. Also, more rarely, found on cliff-tops, ledges and rough ground near the sea. On sand dunes it typically occurs on semi-mobile foredunes dominated by *Ammophila arenaria* or *Leymus arenarius*. Grows in lowland altitudes. (Preston, *et al.*, 2002).

1.2. Description

Culms to 75cm, scattered; rhizomes very long, sheaths fused more or less to auricles. Ligules less than 1 mm; spikelets 8-14mm; upper glume 3-9 mm with awns 0.5-2.5 mm. (Stace, 2001).

1.3. Current status

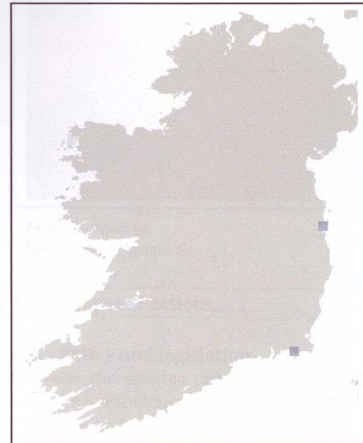
The 1962 Atlas survey underestimated the distribution of this species which now includes both *F. juncifolia* and *F. rubra* subsp. *arenaria*. (Preston, *et al.*, 2002). In Ireland, there is one site possibly left in the Bull Island, Co. Dublin, where the species was last recorded in 1970. (Doogue, *et al.*, 1998).

1.4. Economic importance

It is listed under agricultural/ horticultural crops in Mansfeld database

2. Current factors causing loss or decline

Population pressure and habitat loss. The Bull Island population is threatened by



Distribution of *Festuca arenaria* in Ireland
Source: (Preston, *et al.*, 2002).



Festuca arenaria
Source: www.biopix.dk

development, population pressure and trampling. Threats to the Island habitats relate to public use of the island, water quality in Dublin Bay and invasion of the saltmarsh by *Spartina anglica*. (www.wetlands.org)

3. Current action

3.1. Protection

The species is not on the Irish Red Data book, nor is it protected by law.

3.2. In situ conservation

The North Bull Island has been designated as a UNESCO Biosphere Reserve in 1981 and a National Nature Reserve- Bird Sanctuary in 1988. (www.clontarfonline.com). It has also been designated as European Union Special Protection Area in 1986 and a Ramsar Wetland Site in 1988. (www.wetlands.org). It is protected under the 1930 and 1976 Wildlife Act. (www.clontarfonline.com).

3.3. Ex situ conservation

Not in *ex situ* collections at present.

3.4. Monitoring and site management

The Bull Island is mainly managed as a recreational island and used by public for day visits, education and golf. The monitoring and research concentrates on pollution and water quality, sedimentation rates and salt marsh succession. (www2.unesco.org). Dublin Corporation manages the site by wardening system. The dunes have been stabilized by planting of *Ammophila*. *Spartina anglica* invasion is controlled by herbicides. (www.wetlands.org)



Festuca arenaria
Source: www.biopix.dk

4. Proposed actions

4.1. Policy and legislation

-Review the species protection status in the Flora Protection Order and review the IUCN red data category.

4.2. Site safeguard and management

-By 2006, ensure that the management plan for the site includes prescriptions for the species conservation.
-By 2009, secure favourable management of the site taking into account the needs of *Festuca arenaria* and include a monitoring program.
-By 2009, ensure that any factors in the site causing decline of *Festuca arenaria* are eliminated.

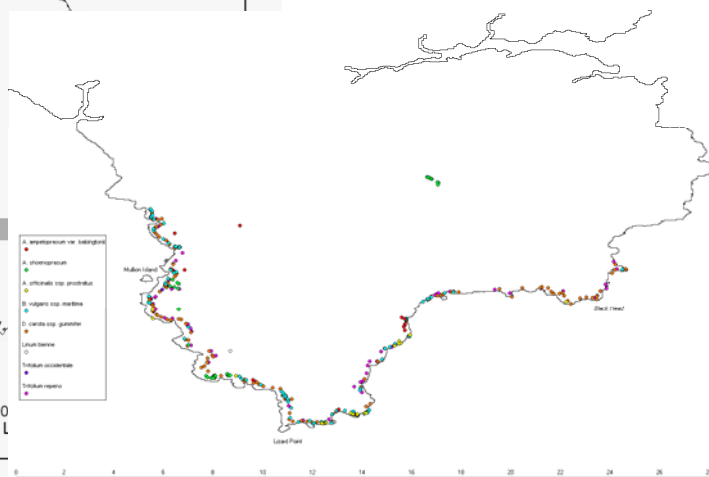
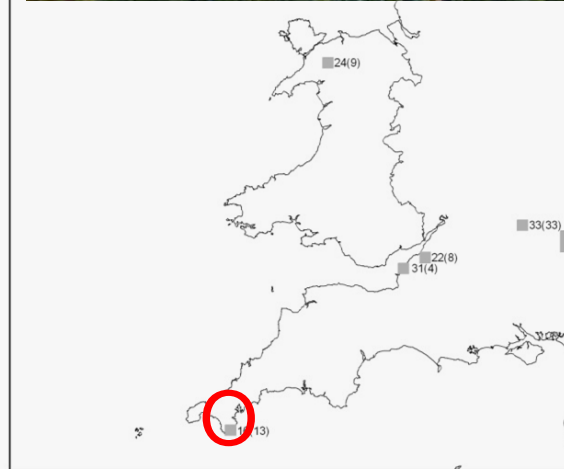
4.3. Species management and protection

-By 2008, publish a species-specific management plan for the conservation of *Cardamine impatiens*.
-By 2006, collect seeds for *ex situ* conservation in the Irish Threatened Plant Genebank, Trinity College Botanic Gardens and duplicate the collections with e.g. the Millennium Seedbank, UK.
-By 2006, ensure the maintenance of *ex situ* living collections in the Trinity College Botanic Gardens and the

Establishing the first CWR genetic reserve in the UK

The Lizard NNR in Cornwall SW England: survey of CWRs Spring 2010

- *Allium ampeloprasum* var. *babingtonii*
- *Allium schoenoprasum*
- *Asparagus officinalis* subsp. *prostratus*
- *Beta vulgaris* subsp. *maritima*
- *Daucus carota* subsp. *gummifer*
- *Linum bienne*
- *Trifolium occidentale*
- *Trifolium repens*



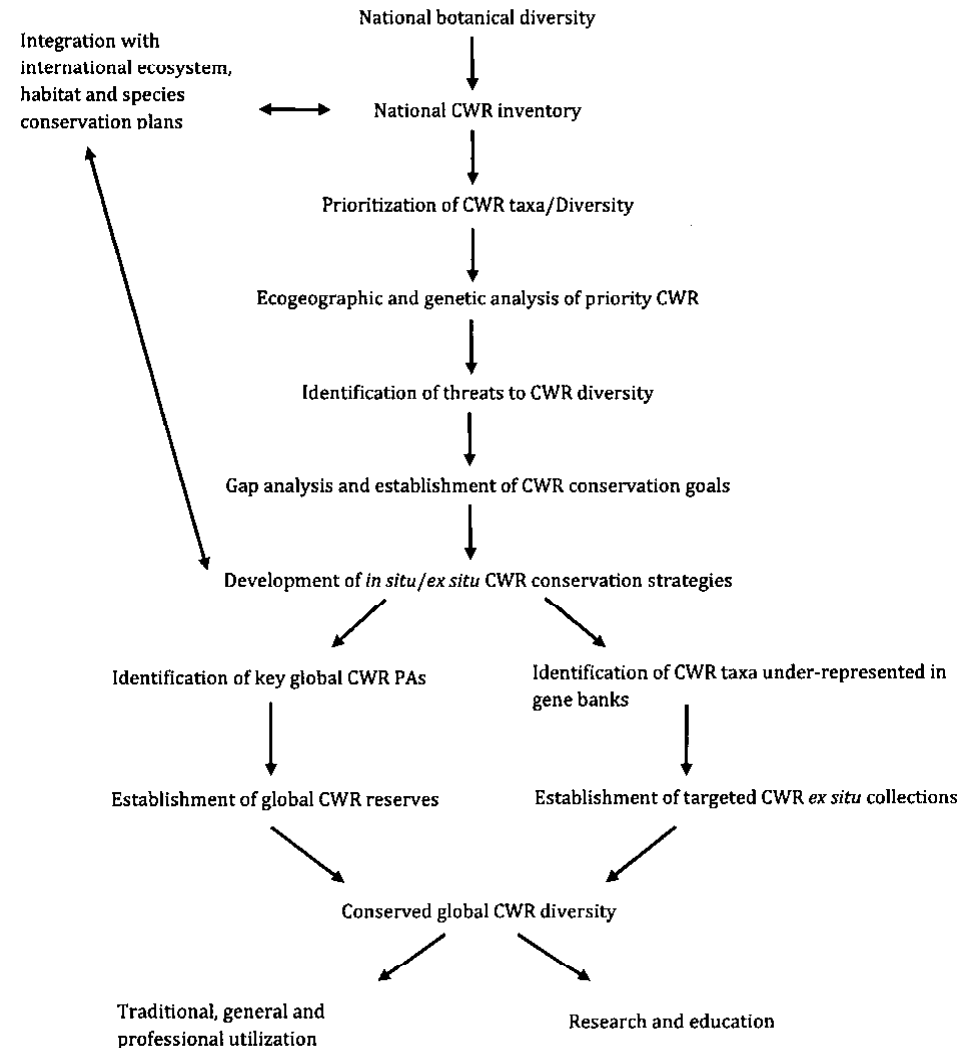
Approaches to CWR networks

- Adopt a holistic approach combining a mix of:
 - Ecosystem approach (CWR do not exist in a biodiversity vacuum)
 - Individual PAs with CWR prioritised
 - National (*in situ* and *ex situ*) and Global CWR Network



PGR Secure: what about me?

- Major existing resources:
 - PGR Forum European and national catalogues of CWR diversity (17,495 sp. in Europe)
 - EURISCO *ex situ* holding of CWR (NB. CWR are 5.6% of total germplasm holdings and represent 1,095 CWR species 6.3% of total CWR)
 - ECPGR *In situ* and On-farm members / EURISCO *In Situ* National Focal Points
 - Methodological experience (Ireland, Portugal, Switzerland and UK)



PGR Secure: what about me?

WP3/4 - Methodology:

1. ECPGR Secretariat Contacted ECP/GR national coordinator for nominations to help national CWR / LR conservation strategy
2. Provide them with PGR Forum national catalogues of CWR diversity.
3. Workshop for National Focal Points (Sept / Oct 2011) to discuss:
 - a. Revision / modification of national CWR inventories.
 - b. Collating of desirable additional data set and making data available e.g. distribution.
 - c. Inventory prioritisation
 - d. Gap analysis
 - e. Production of national CWR conservation strategies
 - f. Baseline assessment of CWR extinction / genetic erosion
 - g. Use of national CWR inventory

PGR Secure: what about me?

Methodology (cont.):

4. National implementation (Oct 2011 – on-going)
5. Partially funded case study country studies:
 - a. CWR – (Italy), Finland and Spain (UK)
 - b. LR – Italy, Finland and (UK)
6. PGR Secure Helpdesk + FAO Toolkit
7. Use national CWR / LR conservation strategies as a means of generating European strategies (WP3 and WP4)

A challenge, an opportunity

PGR Secure: what about me?

WP5: Engaging the user community

- Workshops
 - SWOT analysis of breeders' and conservationists' needs to promote CWR and LR use
 - Comprehensive report analysing the use of CWR and LR by stakeholders



Conclusions

- Increased awareness of the importance of CWR conservation and use, particularly in times of environmental instability and climate change
- Have knowledge and expertise to implement holistic CWR conservation, implementing the ecosystem approach via:
 - Regional / National Network of CWR genetic reserves and systematic *ex situ* collection
- Primary conservation of CWR will be via genetic reserves in PAs for most diversity

