Conservation Strategy for Crop Wild Relatives and Wild Harvested Plants in Portugal

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OBJECTIVES OF THIS PRESENTATION

- CWR and WHP, what are they?
- Why do we need a national CWR and WHP Strategy?
- Portuguese CWR and WHP as a case-study
- Conclusions and relevant points

CROP WILD RELATIVES (CWR)

Those species that are **taxonomically / genetically related to crops** to which they may contribute genes via traditional breeding and biotechnology

WILD SPECIES UNDER THE SAME GENUS AS CROP SPECIES

"A wild plant taxon that has an indirect use derived from its relatively close genetic relationship to a crop; this relationship is defined in terms of the CWR belonging to **Gene Pools 1 or 2**, or **Taxon Groups 1 to 4** of the crop" (Maxted *et al.*, 2006)

Wild Harvested Plants (WHP)

Plants traditionally **collected from the wild** primarily used by local people as a source of food, medicines, fibres, dyes, oils, poisons, used in magic and religious traditions…

- Ethnobotanical / traditional value
- Small scale economic value
- Potential economic value

WHY A NATIONAL CWR AND WHP STRATEGY?

- Unique national resources
- Becoming more **threatened** (human activities, climate change, etc) and therefore are suffering from **genetic erosion**

WHY A NATIONAL CWR AND WHP STRATEGY?

- Legislative requirement to conserve
- CWR and WHP require an integrated *in situ* / *ex situ* approach,

  best implemented via a National Strategy
- No single method of generation

Portuguese CWR and WHP:
case-study

MAIN QUESTIONS

What to conserve?

Which CWR and WHP are more important?

Where to implement national genetic reserves?

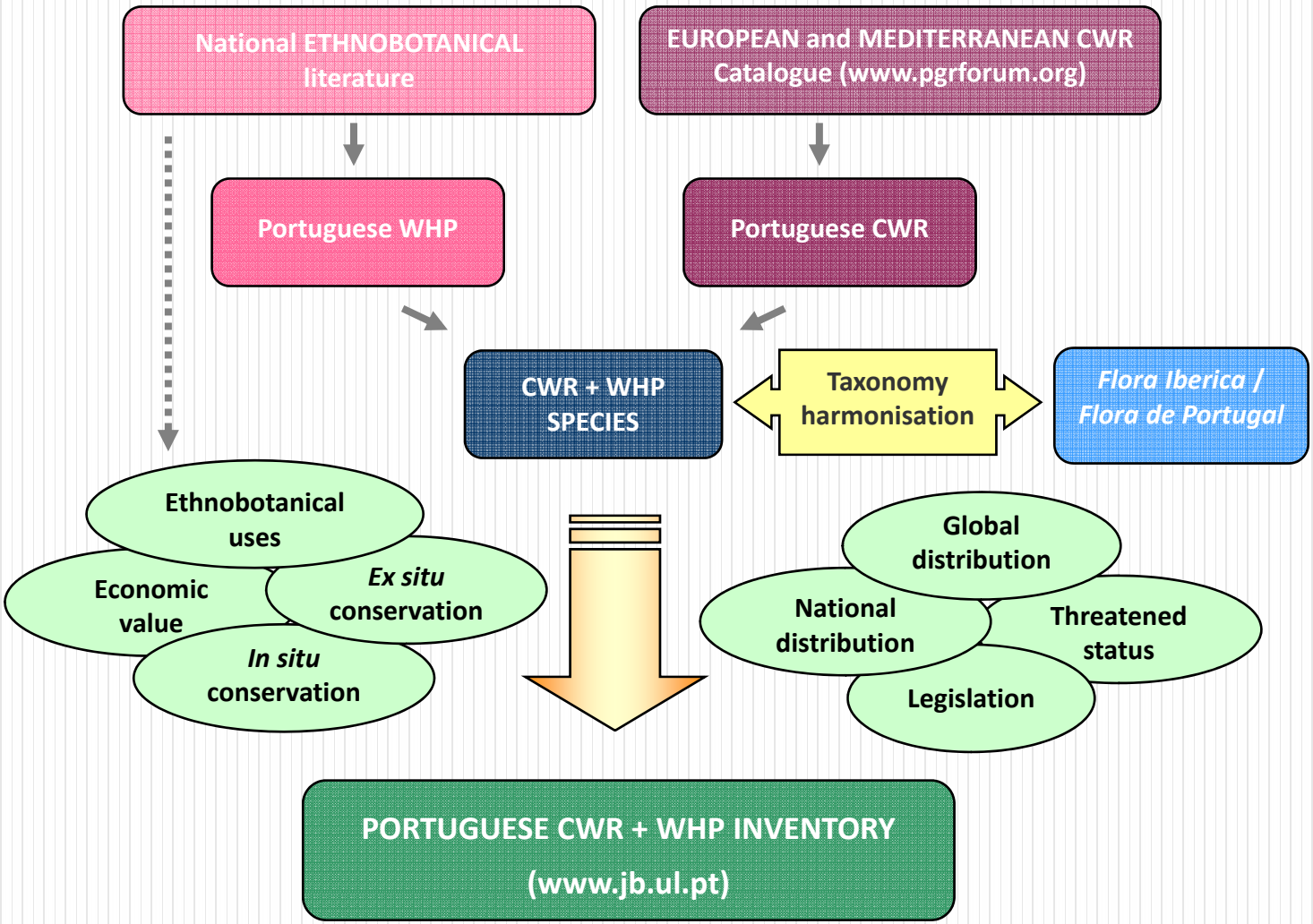
Where to target *ex situ* collections?

NATIONAL INVENTORY OF CWR and WHP

Which CWR and WHP exist in mainland Portugal?

Portuguese CWR and WHP inventory

METHODOLOGY

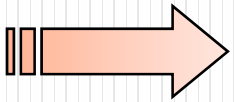


(Magos Brehm *et al.*, 2008)

MAIN RESULTS

2319 taxa

(122 families, 524 genera)



97% CWR

21% WHP

19% both CWR + WHP

- ~93% are native;
- ~ 6% are endemic to Portugal, 11 % are endemic to Iberian Peninsula;
- ~ 16% are threatened;
- Only 12% are currently conserved in Genebanks;
- Only 0.5% are actively conserved *in situ;*
- ~ 6% are under any kind of national/international legislation.

(Magos Brehm *et al.*, 2008)

MAIN QUESTIONS

What to conserve?

√ NATIONAL INVENTORY OF CWR and WHP

Which CWR and WHP are more important?

PRIORITISE CWR and WHP AT NATIONAL LEVEL

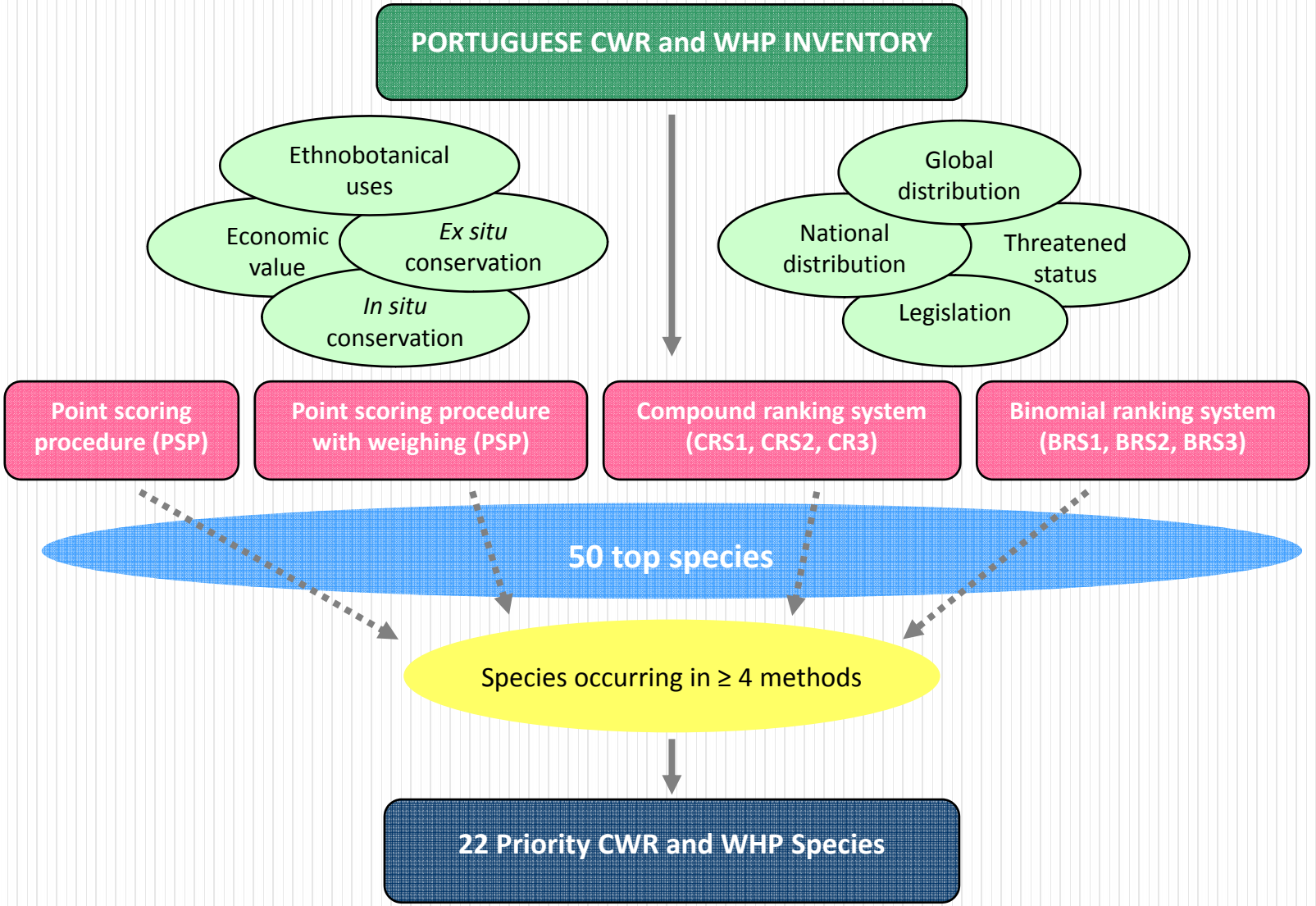
Where to implement national genetic reserves?

Where to target *ex situ* collections?

Which species are more important to conserve?

Establishing conservation priorities for CWR and WHP in Portugal

METHODOLOGY



MAIN RESULTS

SPECIES NAME	SPECIES NAME
Allium pruinatum	*Leuzea longifolia*
A. schmitzii	*Narcissus fernandesii*
A. victorialis	*N. scaberulus*
Daucus carota subsp. *halophilus*	*Plantago algarbiensis*
Dianthus cintranus subsp. *barbatus*	*P. almogravensis*
D. cintranus subsp. *cintranus*	*Quercus canariensis*
D. laricifolius subsp. *marizii*	*Trifolium arvense* subsp. *gracile*
Epilobium angustifolium	*Ulex densus*
Festuca brigantina	*Vicia bithynica*
F. henriquesii	*V. onobrychioides*
Herniaria algarvica	*V. orobus*

22 PRIORITY SPECIES

MAIN QUESTIONS

What to conserve?

√ NATIONAL INVENTORY OF CWR and WHP

Which CWR and WHP are more important?

√ PRIORITISE CWR and WHP AT NATIONAL LEVEL

Where to implement national genetic reserves?

ECOGEOGRAPHIC SURVEY

GAP ANALYSIS

Where to target *ex situ* collections?

GENETIC DIVERSITY STUDY

CLIMATE CHANGE MODELLING

Where to implement genetic reserves?
Where to target *ex situ* collections?

Ecogeographic survey

Gap analysis

Genetic diversity

Climate change modelling

1 - Ecogeographic survey and gap analysis

- Mainly Portuguese and online herbaria and genebanks

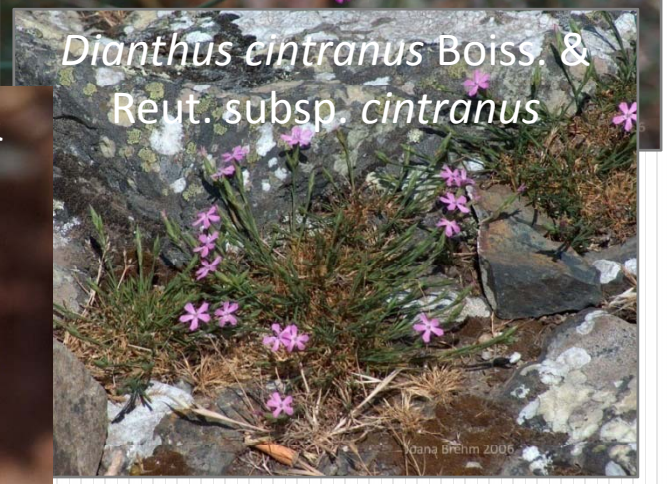
Species distribution

Species 'hotspots'

METHODOLOGY

2 - Genetic diversity

- undertaken for 5 taxa
- about 5-7 populations per species
- AFLP



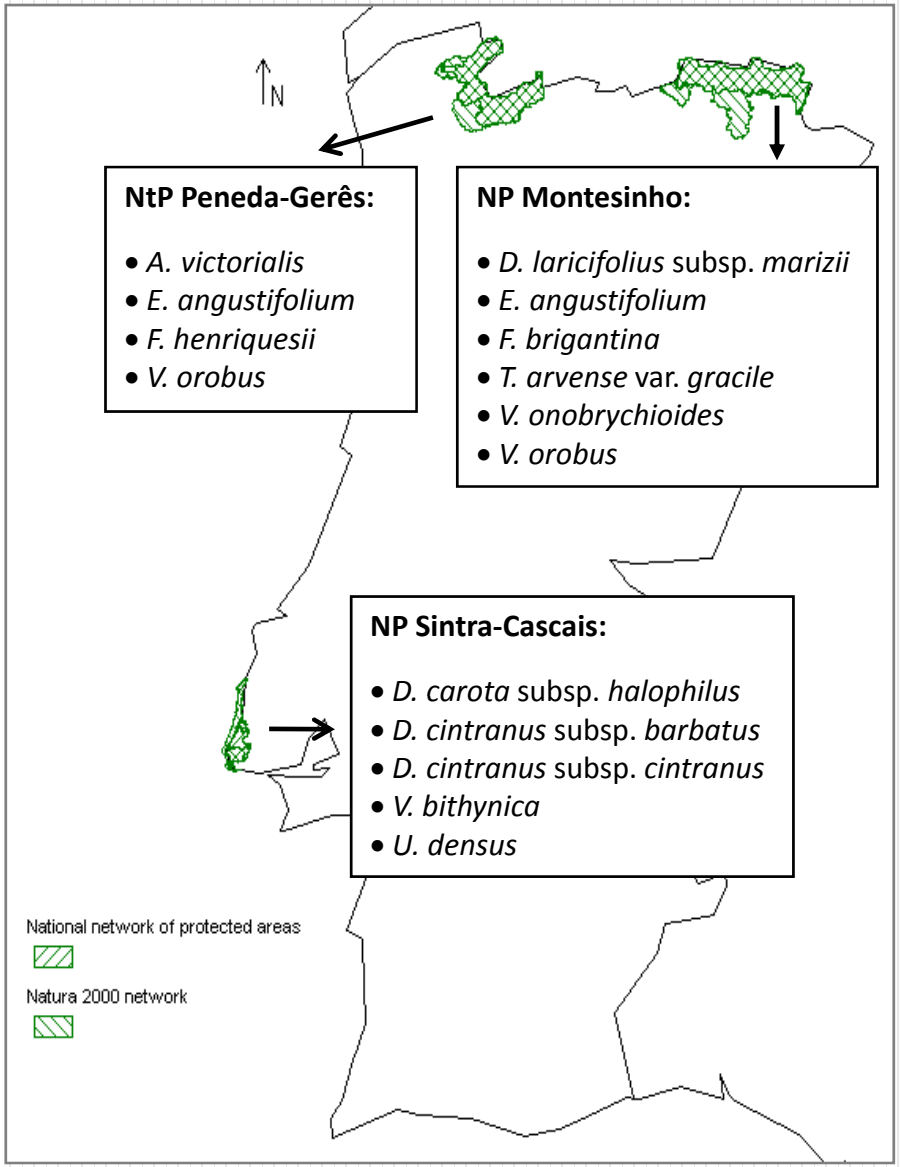
3 - Species distribution prediction with climate change

- **Software:** Maxent v. 3.2.1 (maximum entropy model) (Phillips *et al.*, 2006)
- **Current climate data:** WorldClim v. 1.3 (Hijmans *et al.*, 2005) (19 bioclimatic variables)
- **Future climate scenario:** Community Climate Model version 3 (CCM3) (Govindasamy *et al.* 2003)
  - [CO_2 atm] = 600 ppm ⇒ 2 x [CO_2 atm] of that of pre-industrial era
  - predicted to occur ~2100
- **Measuring climate change:**
  - # of grid cells of highly suitable areas and the extent of suitable area in both climate scenarios
  - identification of conservation areas more affected by climate change

MAIN RESULTS

1 - *In situ* recommendations

- **68% of priority species** conserved (passively) in 3 existing conservation areas
- Genetic reserves establishment needed for active conservation



2 - *Ex situ* recommendations

Priority taxa **not represented** by seed accessions or present valid passport data → all species need to be sampled BUT which are PRIORITIES?

- More endangered and more **negatively affected by climate change**
  - *Dianthus cintranus* subsp. *barbatus*
  - *D. cintranus* subsp. *cintranus*
  - *D. laricifolius* subsp. *marizii*
  - *Epilobium angustifolium*
  - *Festuca brigantina*
  - *Herniaria algarvica*
  - *Leuzea longifolia*
  - *Quercus canariensis*
- **Not included** in the suggested reserves
  - *Allium pruinatum* (including *A. pruinatum* var. *bulbiferum*)
  - *Herniaria algarvica*
  - *Leuzea longifolia*
  - *Quercus canariensis*

CONCLUSIONS AND RELEVANT POINTS

- CWR and WHP are **important resources** for human nutrition and food security;
- They are **under threat** of habitat loss and climate change, and are often overlooked in conservation planning;
- There is an urgent need to **develop conservation strategies** at national level to conserve these resources;

CONCLUSIONS AND RELEVANT POINTS

- There is **no single method** of generating a National Strategy for the conservation of CWR and WHP: it depends on the information available and the priorities of each country;
- I have outlined the basic methodology used to make *in situ* and *ex situ* conservation recommendations for the conservation of the priority Portuguese CWR and WHP.

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