



**PGR Secure International Conference**  
**ENHANCED GENEPOOL UTILIZATION - Capturing wild relative and landrace diversity for crop improvement**  
Cambridge, 16-20 June 2014



# Optimized site selection for the *in situ* conservation of forage and fodder CWRs: a combination of community and genetic level perspectives

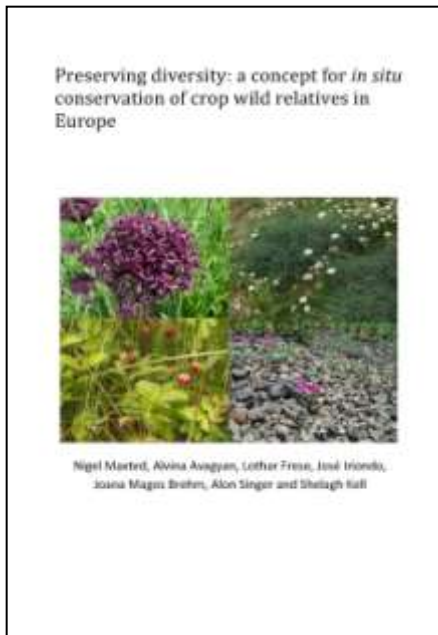
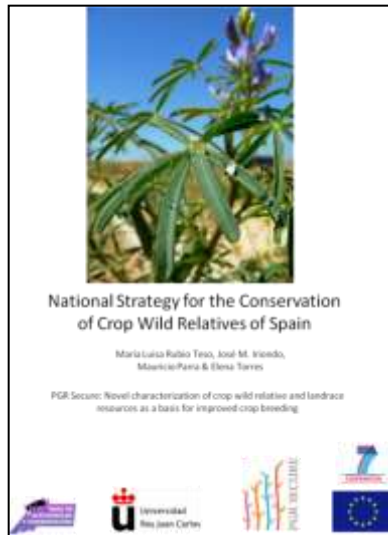
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➔ High concentration of CWR species - HOTSPOTS

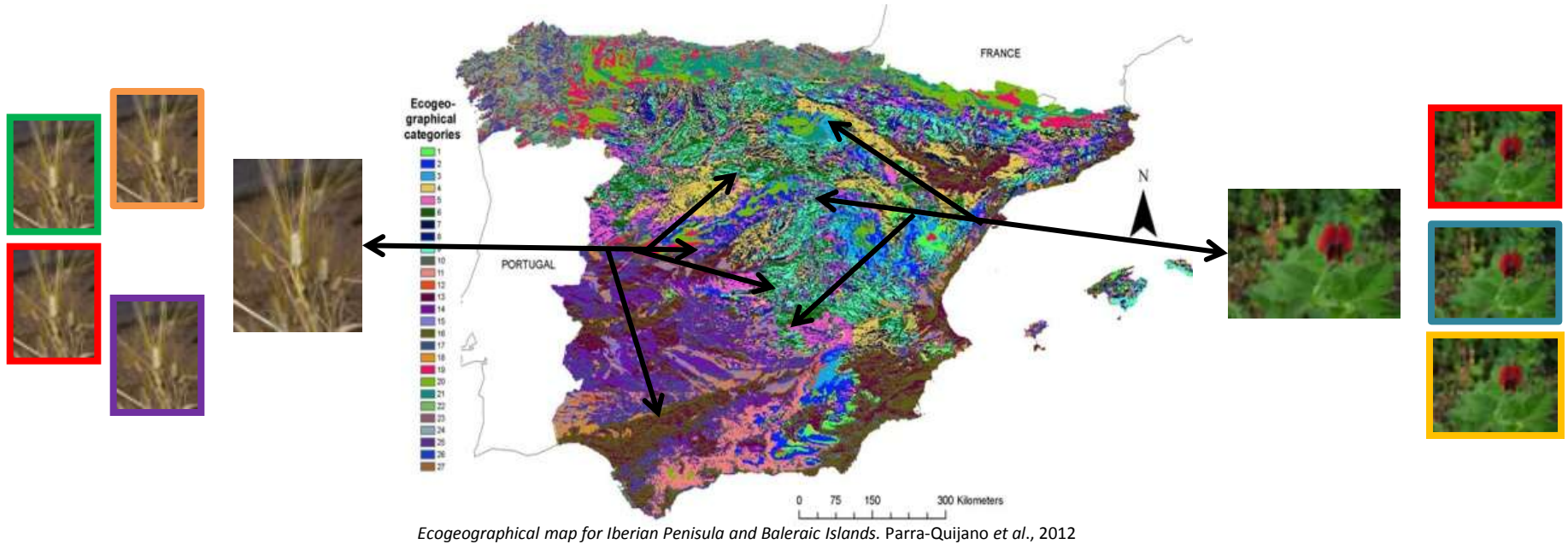
➔ Maximum number of CWR in minimum number of sites – COMPLEMENTARITY AREAS

# Need to optimize due to limited resources

## INTRODUCTION

Not only the number of CWR is important!

Different environmental conditions → different selection pressures



Ecogeographic Land Characterization maps (ELC maps) as a proxy to estimate genetic diversity of adaptive value

Target unit for conservation → populations of one species occurring in a particular ecogeographical unit (EU)

Forage and Fodder PGR frequently grow together → natural communities



Why not identify phytosociological associations as targets for CWR conservation?



*Focus simultaneously on various CWR species*



*Usually contain related species → useful for the breeders*

TESTING OF NEW TARGET UNIT FOR CONSERVATION:

**PHYTOSOCIOLOGICAL ASSOCIATION – ECOGEOGRAPHIC UNIT (PsA-EU)**

## METHODS

Starting point → *forage & fodder CWR in the Prioritized Spanish Checklist belonging to Genepool concept 1B (Harlan & de Wet, 1976) → (44 species)*

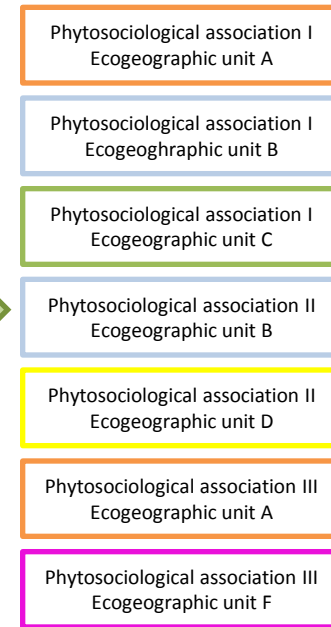
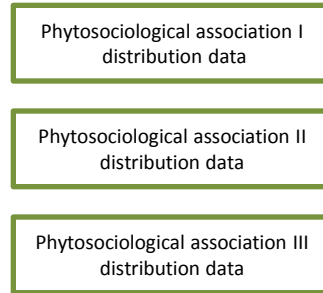
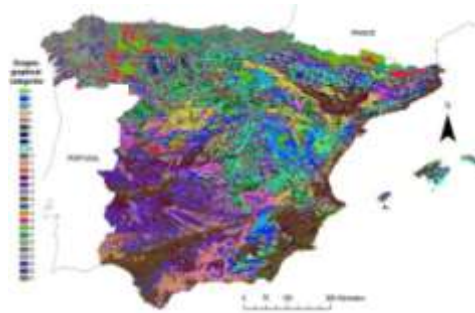
- Identification of phytosociological associations that contain prioritized forage & fodder CWR (Sivim databases: <http://www.sivim.info/sivi/>)
- Download distribution data of phytosociological associations (SIVIM databases: <http://www.sivim.info/sivi/>)



## METHODS

- Creation of PsA- EU target units overlapping distribution data of phytosociological associations selected with ecogeographical map of Iberian Peninsula and Balearic Islands (Parra-Quijano *et al.*, 2012) (ARC-GIS, 10.0)

Ecogeographical map for Iberian Peninsula and Balearic Islands. Parra-Quijano *et al.*, 2012



Target units for conservation  
PsA-EU

- Geographic gap analysis with Natura 2000 network (ARC-GIS, 10.0)
- Complementarity analysis (10x10 km grid) (DIVA-GIS 7.0)

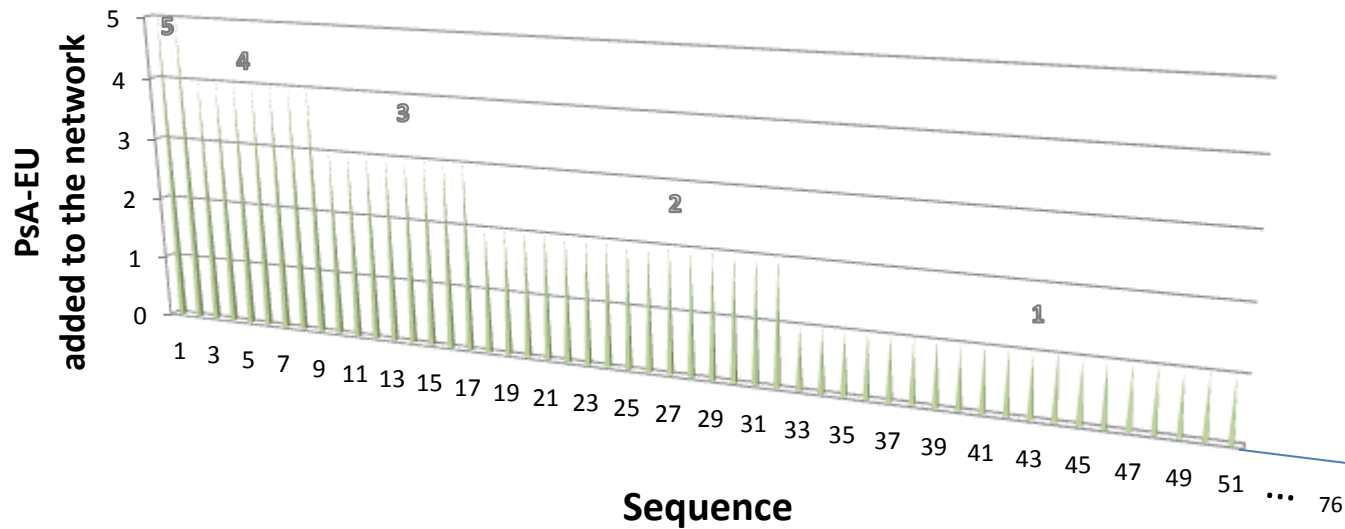
## RESULTS & DISCUSSION

- 44 species classified in GP 1B.
- 13 phytosociological associations contained 33 prioritized species
- 130 conservation units (PsA-EU)
- Gap analysis showed that  $59 \pm 26\%$  ( $M \pm SD$ ) of the conservation units where under passive protection in Natura 2000 network.

Phytosociological association	Genus	Species
Lino biennis-Cynosuretum cristati	<i>Dactylis</i>	<i>glomerata</i>
	<i>Festuca</i>	<i>pratensis</i>
	<i>Poa</i>	<i>pratensis</i>
	<i>Trifolium</i>	<i>dubium</i>
	<i>Trifolium</i>	<i>pratense</i>
	<i>Lolium</i>	<i>multiflorum</i>
	<i>Trifolium</i>	<i>repens</i>
	<i>Agrostis</i>	<i>capillaris</i>
	<i>Festuca</i>	<i>arundinacea</i>
	<i>Lolium</i>	<i>perenne</i>
Rhinantho mediterranei-Trisetum flavescens	<i>Medicago</i>	<i>lupulina</i>
	<i>Dactylis</i>	<i>glomerata</i>
	<i>Trifolium</i>	<i>incarnatum</i>
	<i>Festuca</i>	<i>pratensis</i>
Trifolio cherleri-Taeniatheretum caput-medusae	<i>Poa</i>	<i>pratensis</i>
	<i>Trifolium</i>	<i>angustifolium</i>
	<i>Trifolium</i>	<i>arvense</i>
	<i>Trifolium</i>	<i>striatum</i>
Festuco amplae-Poetum bulbosae	<i>Trifolium</i>	<i>campestre</i>
	<i>Poa</i>	<i>bulbosa</i>
	<i>Trifolium</i>	<i>subterraneum</i>
Helianthemum guttati	<i>Trifolium</i>	<i>striatum</i>
	<i>Trifolium</i>	<i>arvense</i>
	<i>Trifolium</i>	<i>nigrescens</i>
<i>Alchemillo flabellatae-Nardetum strictae</i>	<i>Trifolium</i>	<i>campestre</i>
	<i>Agrostis</i>	<i>capillaris</i>
Anthoxantho ovati-Vulpium geniculatae	<i>Poa</i>	<i>alpina</i>
	<i>Medicago</i>	<i>arabica</i>
Buxo sempervirentis-Quercetum pubescentis	<i>Trifolium</i>	<i>resupinatum</i>
	<i>Poa</i>	<i>compressa</i>
Coleostepho myconis-Chamaemeletum fuscum	<i>Trifolium</i>	<i>medium</i>
	<i>Lupinus</i>	<i>angustifolius</i>
Diplotaxi virgatae-Fedietum cornucopiae	<i>Ornithopus</i>	<i>compressus</i>
	<i>Medicago</i>	<i>rigidula</i>
Hedysaro coronarii-Phalaridetum coerulescentis	<i>Medicago</i>	<i>truncatula</i>
	<i>Hedysarum</i>	<i>coronarium</i>
Linario eleganti-Anthoxanthetum aristati	<i>Trifolium</i>	<i>squarrosum</i>
	<i>Lupinus</i>	<i>luteus</i>
Trifolio fragiferi-Cynodontetum dactyli	<i>Ornithopus</i>	<i>sativus</i>
	<i>Agrostis</i>	<i>stolonifera</i>
	<i>Medicago</i>	<i>sativa</i>

## RESULTS & DISCUSSION

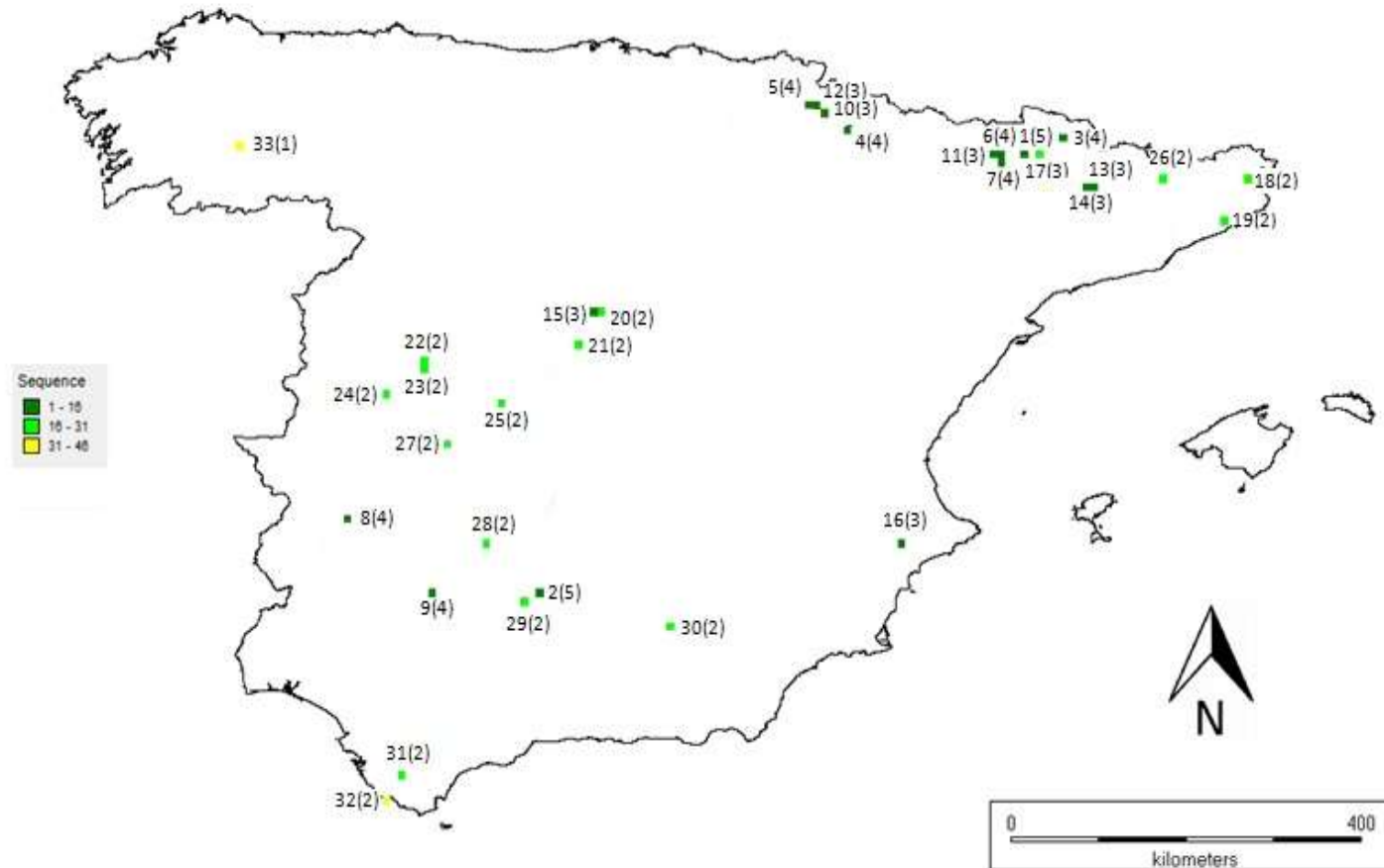
- Complementarity analysis identified 76 places for a full conservation of selected CWR (130 conservation units PsA-EU)





## RESULTS & DISCUSSION

- 33 sites would give protection to all prioritized species (33 species) and to 68% of the conservation units PsA-EU



## CONCLUSIONS

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- Completing phytosociological inventories is needed to improve quantity and quality of the distribution records.
- The phytosociological association approach is useful to reduce number of conservation units in the fodder & forage case study, focusing on various species at a time.
- The joint use of phytosociological associations together with ecogeographical information allows to design conservation strategies that efficiently maximize not only the number of species to conserve but also their potential genetic diversity.
- The use of this approach can help directing efforts for an efficient design of a network of genetic reserves



THANKS FOR YOUR ATTENTION

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