

European seed stocks of wild species in seed banks:

Where is Europe standing concerning the target 8 of the GSPC?

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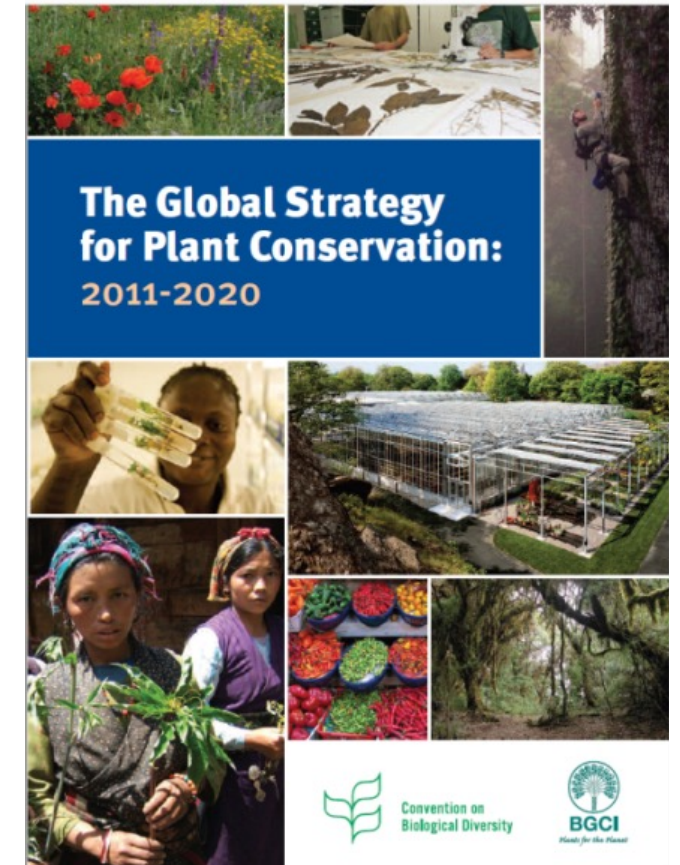
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Background: The objective

- GSPC target 8
 - 75% of all threatened species conserved *ex situ*
 - 20% available for restoration activities
- Target 4 in Kunming-Montreal Biodiversity Framework (BDF)
 - Prevent extinctions, restore habitats, populations and their genetic diversity by in situ and ex situ conservation
 - rather general - no numbers ☹️



Background: Seed banks

The importance of seed banking

- Storage of >95 % of European flora possible
- Little space, low costs
- No problems of inbreeding and genetic drift
- Long storage time (several decades to a century)
- MSB: world plant diversity hotspot
 - >40 000 species



GSPC: Where are we standing?

Status of European ex situ conservation in seed banks unclear

- Rivière & Müller 2017 Oryx
 - 62% of RL species conserved
 - 48% available for translocations
 - European Red List.
 - ENSCOBASE data
 - Quality of the accessions unclear

Contribution of seed banks across Europe towards the 2020 Global Strategy for Plant Conservation targets, assessed through the ENSCONET database

S. RIVIERE and J. V. MÜLLER

Abstract To meet the international biodiversity targets of the 2011–2020 Global Strategy for Plant Conservation, it is important to assess the success of coordinated ex situ plant conservation initiatives such as the European Native Seed Conservation Network (ENSCONET), which operated during 2005–2009, and the ENSCONET Consortium, which was established in 2010. In particular, analysis of the ENSCONET database (ENSCOBASE) indicates that ex situ seed banks have been making significant progress towards meeting targets 8 (at least 75% of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20% available for recovery and restoration programmes) and 9 (70% of the genetic diversity of crops, including their wild relatives and other socio-economically valuable plant species, conserved, while respecting, preserving and maintaining associated indigenous and local knowledge) for native European species. However, the infraspecific diversity of threatened species stored in ENSCONET seed banks needs to be increased to meet research and conservation objectives.

including 'ease of storage, economy of space, relatively low labour demands and consequently, the capacity to maintain large samples at an economically viable cost' (BGCI, 2016a). In addition, 'seeds are a convenient means of long-term storage of genetic diversity, as the samples are small in size, are easily handled, require low maintenance and frequently remain viable for long periods' (BGCI, 2016a). In this context, regional networks of seed banks are important frameworks for the development of national and regional conservation strategies and action plans.

Examples of such networks include the Australian Seed Bank Partnership, which brings together Australia's leading botanical institutions, seed scientists and conservation and restoration experts to collaborate in the collecting and banking of native seed for conservation (Sutherland & Aylott, 2015), and the U.S. Center for Plant Conservation network, which maintains the National Collection of Endangered Plants, which is a bank of seeds, cuttings and other plant material from the country's most imperilled native plants (Galbraith & Kennedy, 2006; BGCI, 2016b).



GSPC: Where are we standing?

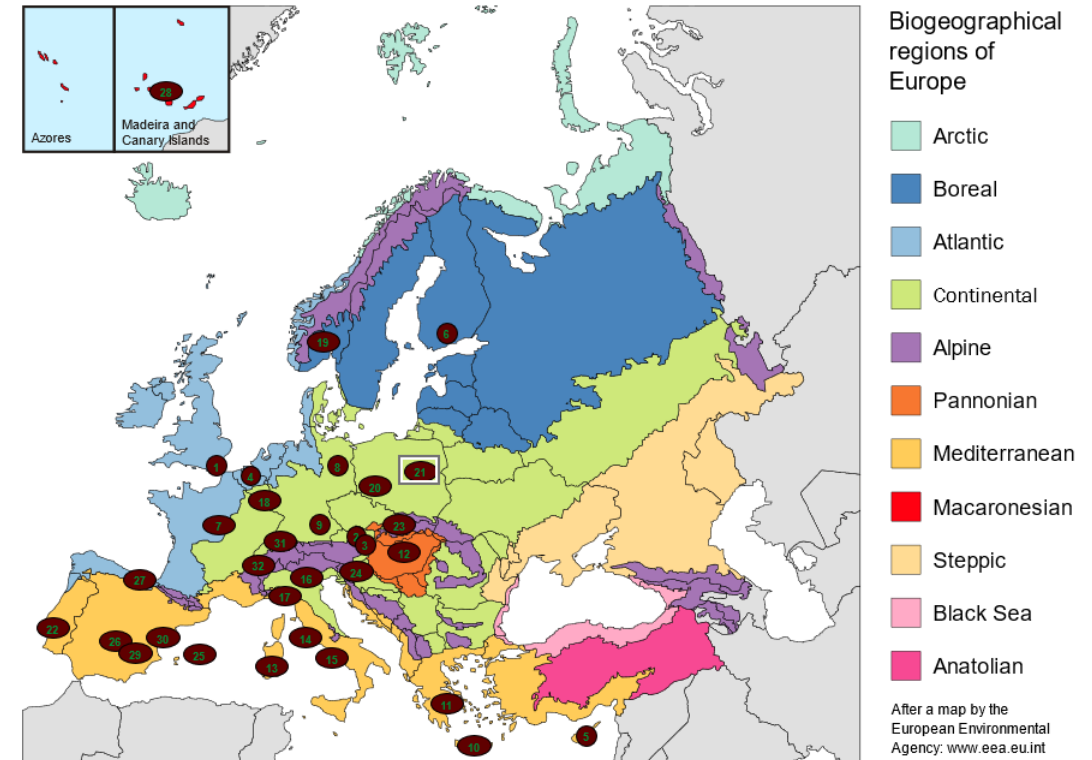


- **ENSCONET**

- Seed bank network of currently 33 members
- Common database (ENSCOBASE)
- Exchange of experience, technics
- Scientific projects

But

- Database is under reconstruction – data therefore not updated
- many seed banks not members



The Seed Bank Survey

The seed bank survey (Objective 2 in WG2)

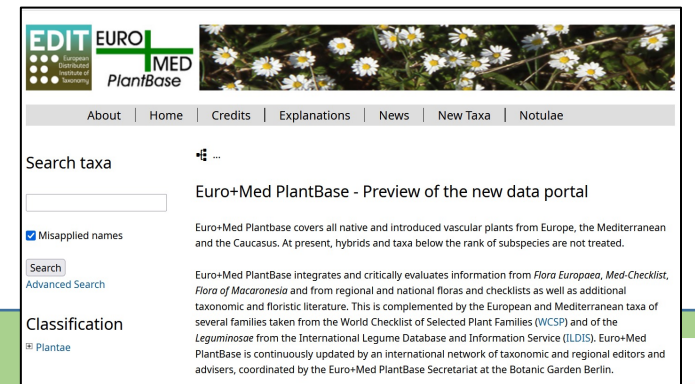
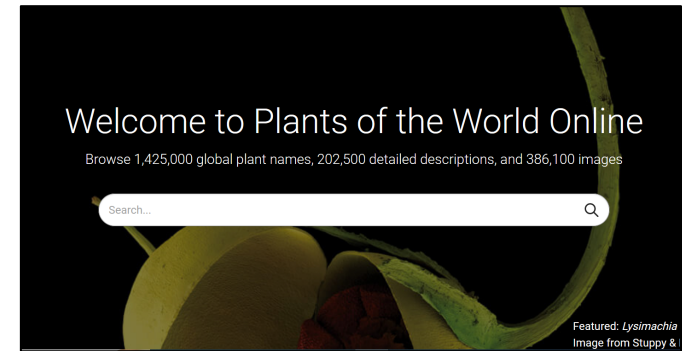
- Almost 200 potential seed banks identified with the help of the MC country representatives of the action
- Questionnaire sent out to all institutions
- Information on their collections (number of taxa, origin, storage conditions etc) assembled
- Data collection 2020 – 2022
- Data preparation and cleaning 2022-2024



The Seed Bank Survey

Taxonomic harmonization:

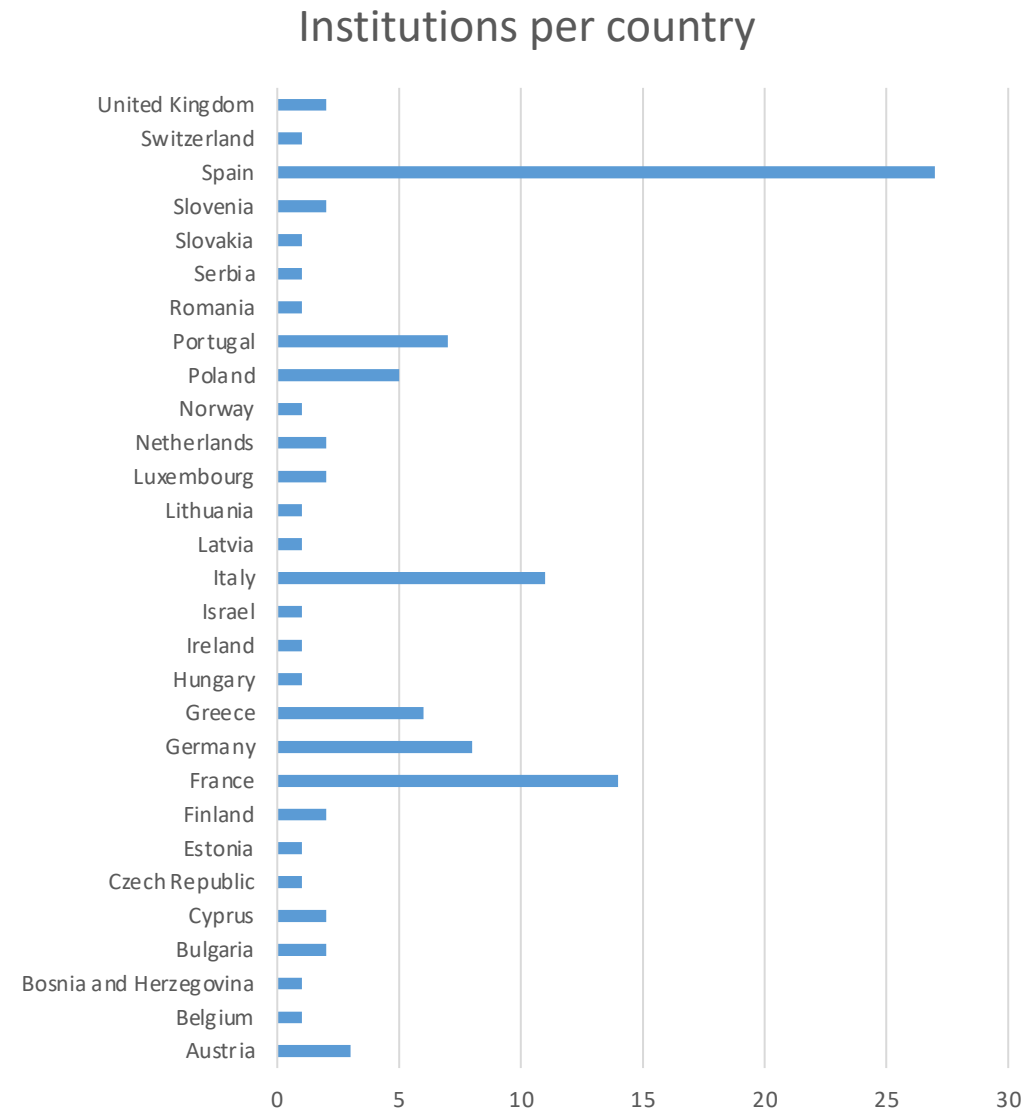
- Matching again POWO, WFO and Euro+Med
- Manual check of several tens of thousands of accessions because of unclear matching – typos, grammar, non-accepted species.
- Assignment of the Red List status thanks to WG3 (Red Lists Database of Europe)!



GSPC target 8

Results:

- Data from 109 institutions (~30 crop gene banks)
- 29 countries

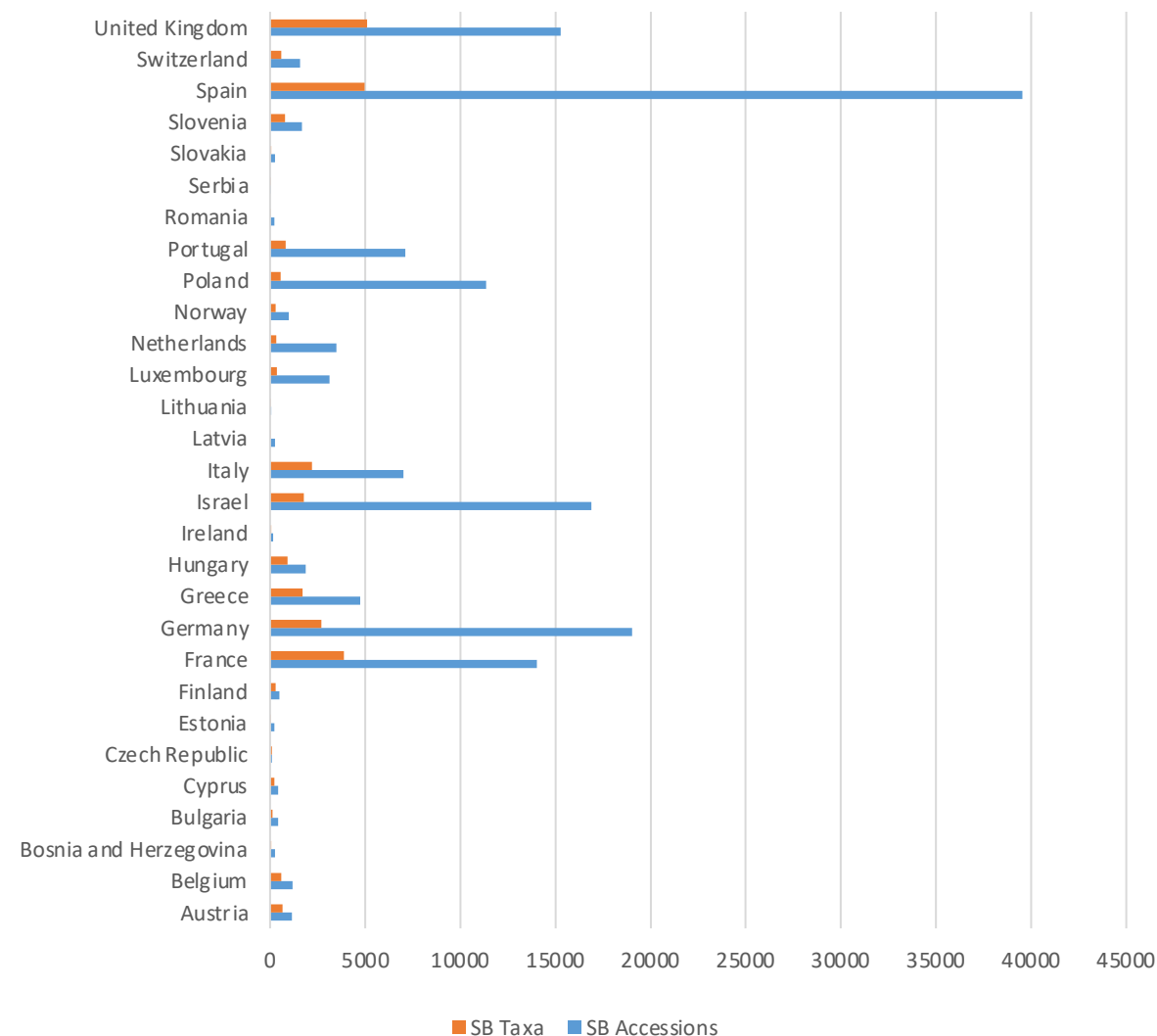


GSPC target 8

Results:

- Data from 109 institutions (~30 crop gene banks)
- 29 countries
- 153'146 accessions
- ~12'732 taxa
- Winner UK: 5109 taxa (1860 from UK itself)

Seed accessions and taxa per country

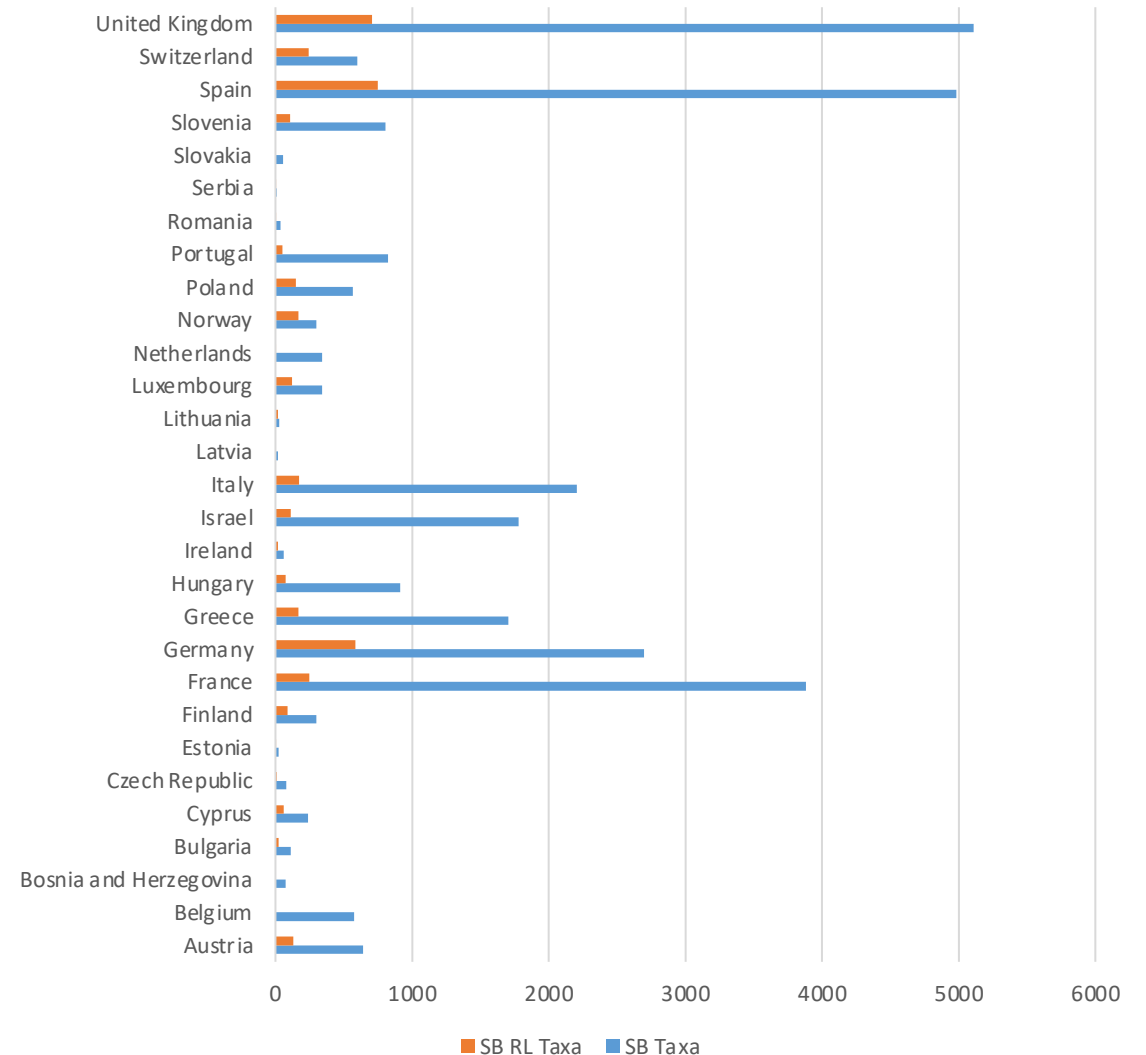


GSPC target 8

Results:

- 3869 Red List taxa in total - 40% of European RL !
- 100 extinct or regionally extinct taxa
- Winner Spain
- 2 RL from Belgium, non for Latvia and Slovenia

Total taxa and Red Listed taxa per country

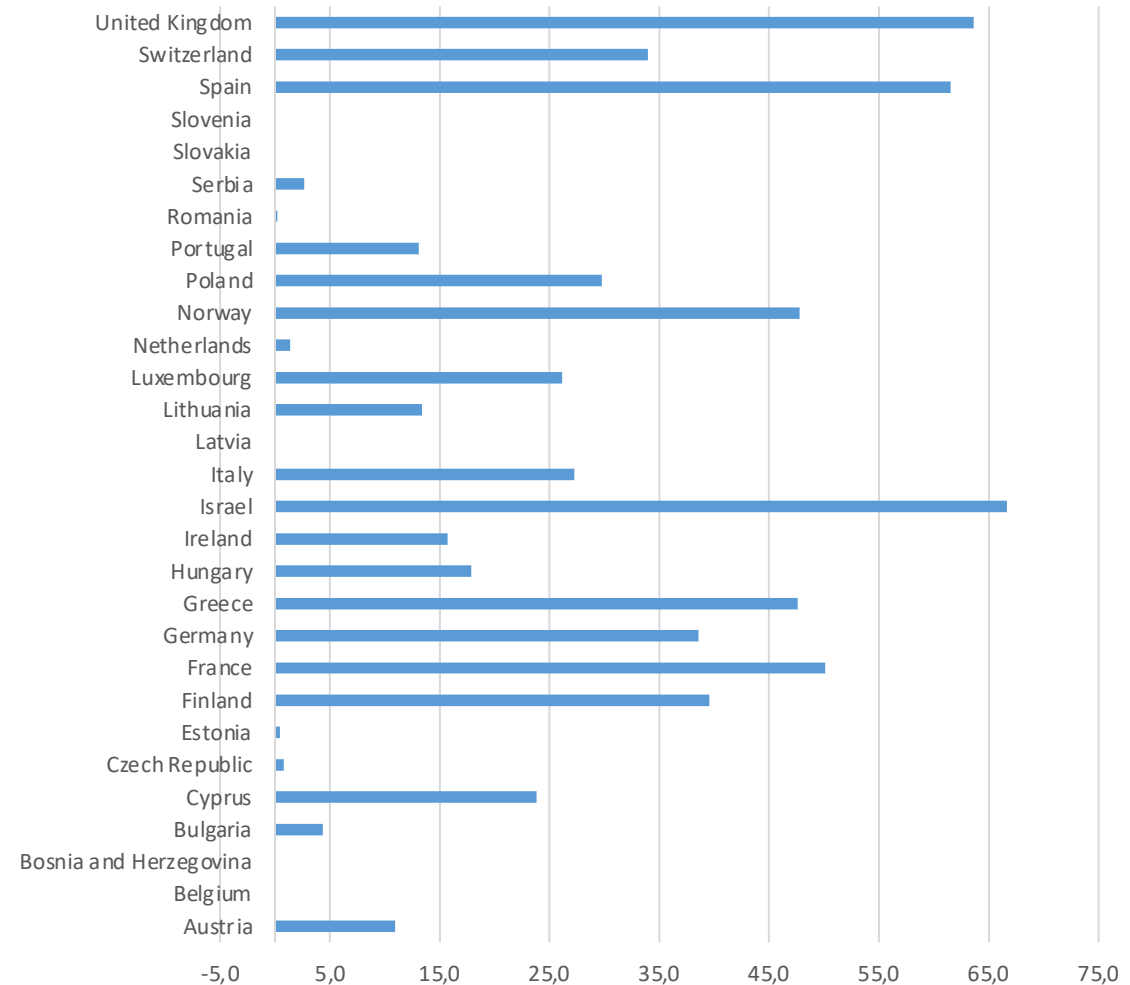


GSPC target 8

Results:

- GSPC target 8 not reached by any of European countries by 2021 !
- Hit list Israel (66%), UK (63%) and Spain (61.5%)
- Mean: 24.5%

Percentage red listed taxa per country



Conclusions

- GSPC target 8 not reached
- Status of ex situ seed conservation very different across countries
- Only 3 countries approached the target, 5 countries below 1%
- Still huge work to be done!
- Perspectives:
 - Phylogenetic gaps (A. Carta)
 - Geographic gaps
 - Quality of accessions (low seed number)



Thanks for your attention!

- Special thanks: Sandrine Godefroid, Adelaide Clemente, Elke Zippel and Udi Liu!
- 109 contributing institutions!



Country	RL Taxa SB	RL Taxa DB	Percentage RL
Austria	129	1182	10.9
Belgium			
Bosnia and Herzegovina		386	0.0
Bulgaria	24	551	4.4
Cyprus	62	260	23.8
Czech Republic	8	987	0.8
Estonia	1	220	0.5
Finland	89	225	39.6
France	247	493	50.1
Germany	584	1515	38.5
Greece	170	357	47.6
Hungary	76	425	17.9
Ireland	19	121	15.7
Israel	114	171	66.7
Italy	172	631	27.3
Latvia	0		
Lithuania	19	142	13.4
Luxembourg	119	455	26.2
Netherlands	6	436	1.4
Norway	170	356	47.8
Poland	149	501	29.7
Portugal	52	397	13.1
Romania	1	420	0.2
Serbia	2	75	2.7
Slovakia	0	612	0.0
Slovenia	107		
Spain	750	1219	61.5
Switzerland	245	722	33.9
United Kingdom	214	338	63.3

