

Genetic Diversity, conservation and crop wild relatives (CWR)

Progress and Perspectives: Ireland

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Crop Wild Relatives

- *CWRs have contributed many useful genes to crop plants. Modern varieties of most major crops contain genes from their wild relatives.*
- *CWRs are an important resource for maintaining sustainable agro-ecosystems into the future.*

Ireland (FAO, 1995):

- Indigenous plant genotypes unique to Ireland may exist due to its isolation and westerly location to mainland Europe. Little is known of the plant genetic resources that exist in Ireland, particularly with regard to indigenous species in the wild.



Anonymous (1995) Ireland: Country report to the FAO International Technical Conference on Plant Genetic Resources (Leipzig 1996). Department of Agriculture, Food and Forestry, Dublin

CWR status in numbers - Ireland

- Department of Agriculture, Food & the Marine responsible for the coordination and promotion of measures for the conservation and utilisation of genetic resources for food and agriculture.
- Department is supported by a national Advisory Committee on Genetic Resources for Food and Agriculture.
- 181 Crop Wild Relative species recorded in Ireland (Curtis, 2009).
- 102 known (ITPGRFA) Annex 1 Crop Wild Relative plant genera and species in Ireland.

Annex 1 species are considered as a priority for conservation.

Curtis, T. 2009. Final Report on the Project: *The production of a priority list of crop wild relatives for Ireland*. Irish Department of Agriculture.

Annex 1 compiled by 'The International Treaty on Plant Genetic Resources for Food and Agriculture' (ITPGRFA)

Crop Wild Relative Ex-Situ Conservation Initiatives - Ireland

- Department of Agriculture (DAFM) seed bank facility in Backweston, focusing mainly on Irish crops, crop wild relatives and landraces.
- DAFM Tops Potato Centre in County Donegal: > 400 unique varieties of potato held in both *in vitro* and *in situ*.
- Teagasc: perennial ryegrass & white clover, potatoes
- Trinity College Dublin Botanic Gardens: Threatened Irish Plant Genebank
- NGOs:
 - Irish Seed Savers Association (ISSA) Co. Clare
 - Genetic Heritage Ireland (GHI)

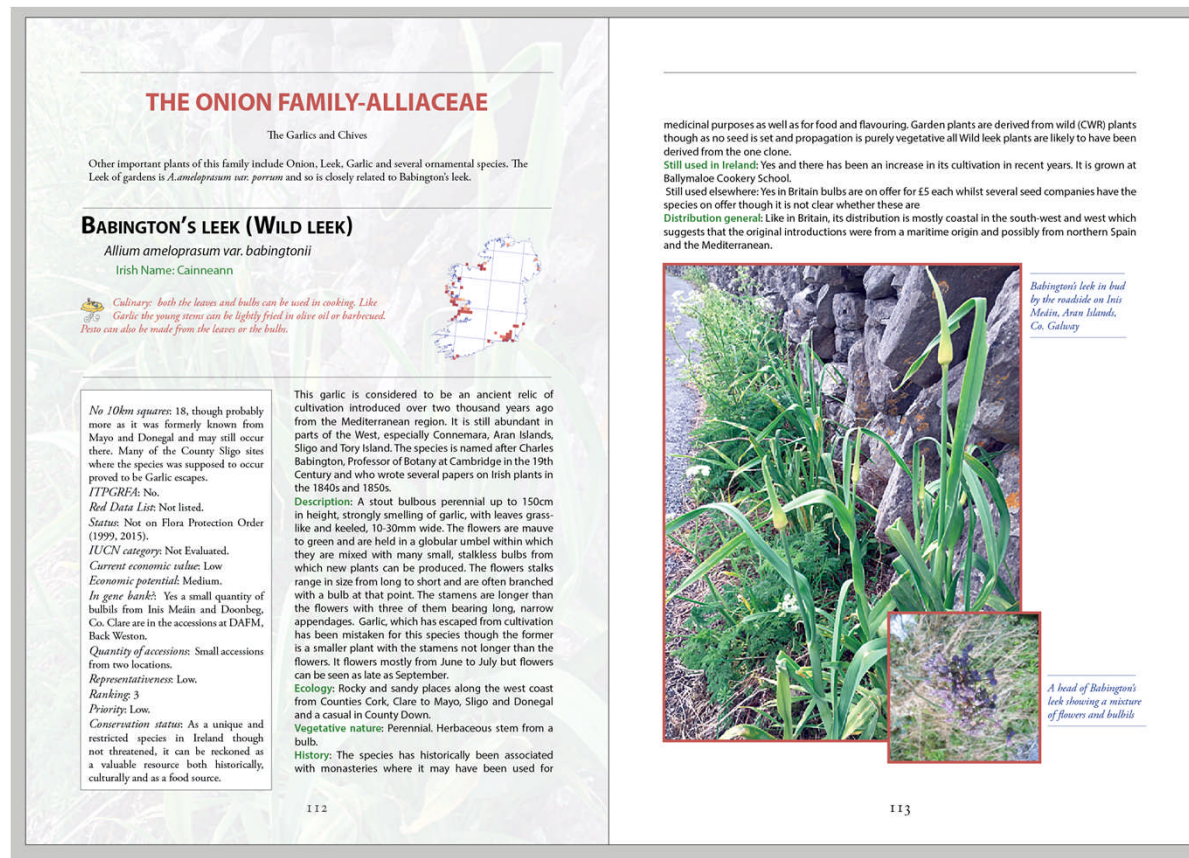


Documentation: National Crop Wild Relative Database

- The National Crop Wild Relative database held by National Biodiversity Data Centre in Waterford, established 2010.
- Primary data sources:
 - Data on the distribution of 55 CWR Annex I:
 - (1) the National Vegetation Database
 - (2) National Herbarium Glasnevin
 - (3) National Parks and Wildlife Service Threatened species database
- CWR data collected by Genetic Heritage Ireland 2009-2010.
- Data collected by National Biodiversity Data Centre during DAFM funded projects 2011 - 2013: Recording of native crop wild relative species from key underrecorded areas.
- Data from all other relevant plant data sets held by the Data Centre incorporated (Botanical Society of the British Isles).



Documentation & Outreach: Raising public awareness

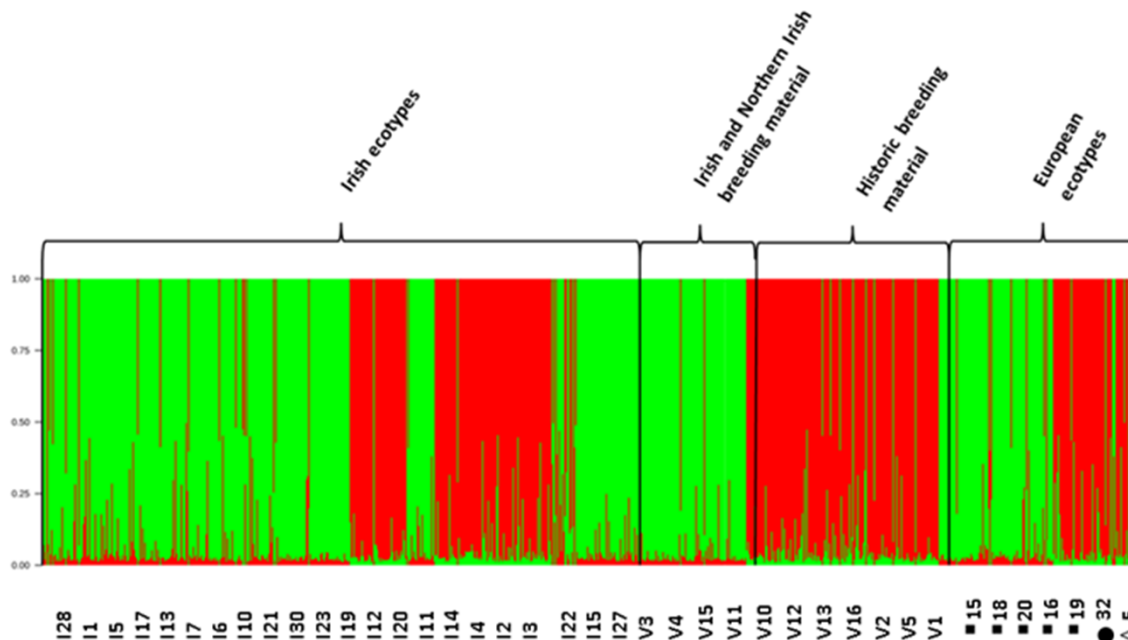


'The Heritage Wild Food and Crop Plants of Ireland' (Crop Wild Relatives)

Tom Curtis and
Paul Whelan,
to appear spring 2018
Cork University Press

Documentation & Utilisation:

- Other public outreach documentations:
 - Potatoes (Choiseul et al 2008)
 - Heritage Apples (Hennerty 2014)
- Scientific documentation: Perennial ryegrass (*Lolium perenne* L.)



Barth S, McGrath S, Arojju SK & Hodkinson TR (2015) An Irish perennial ryegrass genetic resources collection clearly divides into two major gene pools. Plant Genetic Resources: Characterization and Utilization doi:10.1017/S1479262115000611

In situ conservation, the challenge

- *In situ conservation well underway for apples (NGO held) and potatoes (DAFM & Teagasc)*
- *In situ conservation completely lagging behind or non-existent in many important species like forages*

Hindrances:

- *More complicated pollination biology of some species (outcrossing species and or pollinators required)*
- *Minimum number of plants per population required (effective population size N)*
- *Often landscape approach required, e.g. forages*
- *No suitable long term initiatives/instruments available*
- *Threats to habitats*



Images courtesy: Irish Seed Savers



Threats to Crop Wild Relatives



population pressure, habitat loss, alteration and fragmentation, genetic and environmental pollution, alien and invasive species, changes in land management, grazing pressure, climate change and lack of coordination, commitment and financial support to genetic conservation...

Maritime Beet: Irish in-situ resources 2002-2007

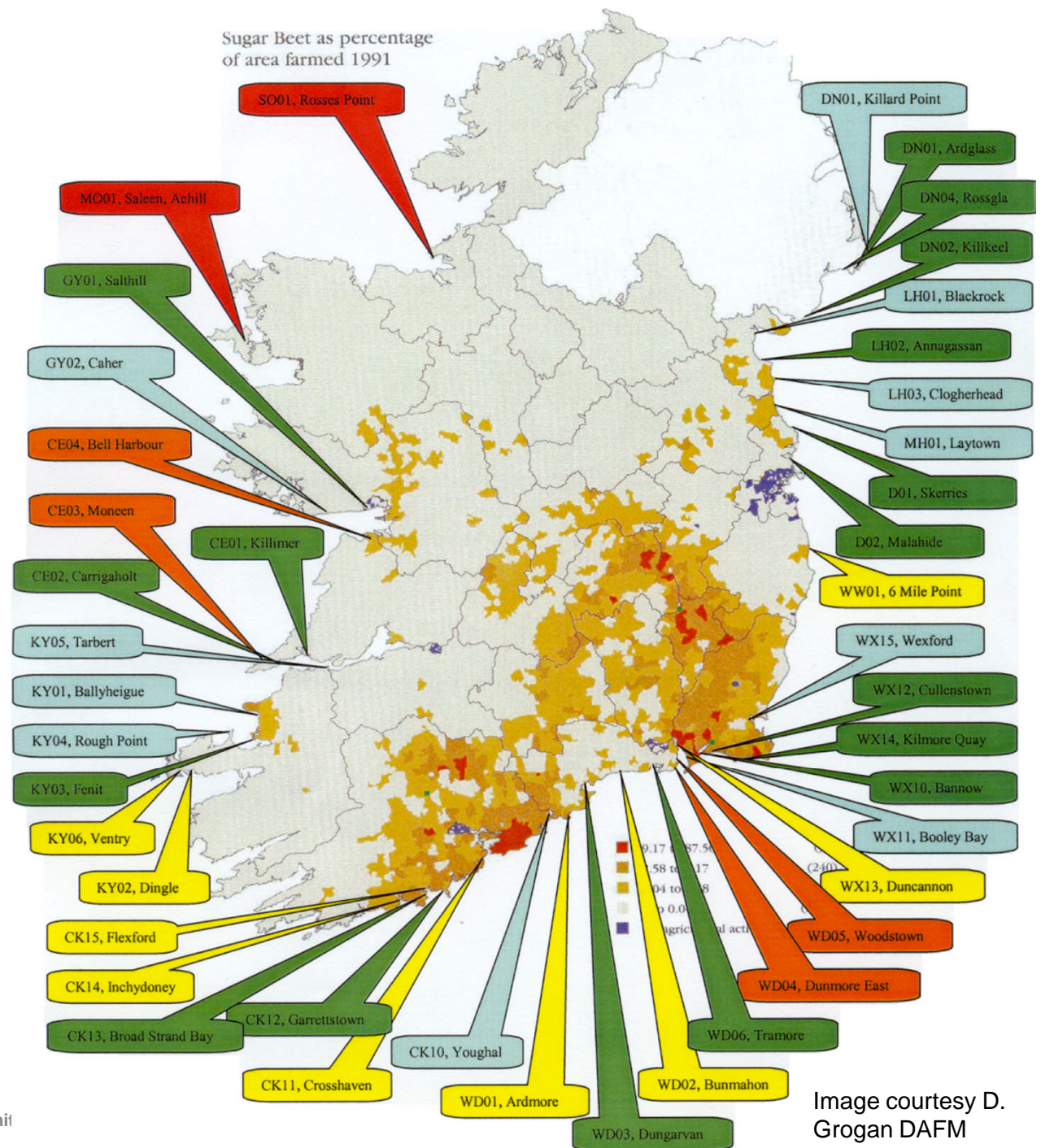


Image courtesy D. Grogan DAFM

Threat status – example wild beta

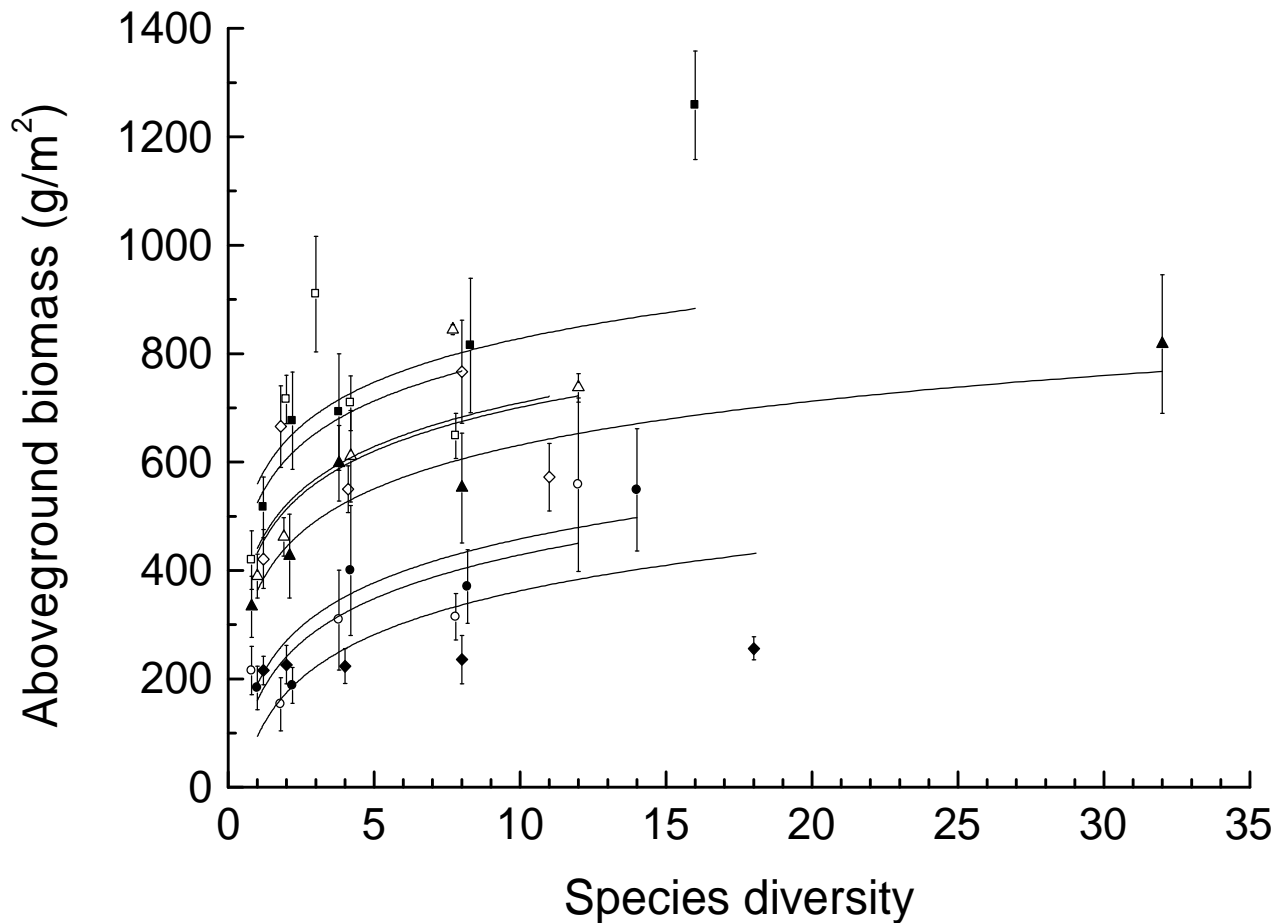
- 2002-2007 surveyed populations in general better than the 1987 surveyed populations.
- On the east, south and southwest coasts, the majority of *in-situ* populations were not under any immediate threat of destruction.
- On the west coast, north of Galway Bay, no plants were found at two locations, Achill Island, and Ross's Point.
- Evidence of the negative impact of coastal erosion and human activity on habitat was evident at all sites.
- A number of sites should be designated as areas of scientific interest, and maritime beet included as a plant of interest on information guides at such sites.
- Relevant local authorities were contacted and made aware of these CWR resources in their areas.

In situ conservation – ways forward, forages & herbs (forbs)

- Landscape approach needed to capture specific habitats for species
- Need to cultivate land to preserve species in situ
- Need to develop concepts
- Collaborative European research required
- National Parks and Wildlife Service areas?
- Creation of long term conserved agricultural conservation areas managed by farmers: Long term instruments in CAP?
- Positive examples in Switzerland & Norway



Benefits grassland mixtures: Aboveground biomass declines with loss of plant species richness



On average, each halving of richness reduced biomass by 80 g m⁻² and loss of resource use efficiency (Hector et al., *Science*, 1999). Semi-natural grassland species, no fertiliser added.

Summary & conclusion

- Several ex situ conservation collections available, but for most CWR species small numbers only
- Ex situ conservation expensive: mainly labour for regeneration, quality control of seed and characterisation of stored materials
- Forage and potato collection in safety duplicate in Svalbard
- Documentation for CWRs well underway, but needs continued updating and networking with other countries and initiatives
- Good outreach activities initiated
- In situ conservation strategies lagging behind
- In situ conservation effective to conserve CWRs of multiple species under traditional agricultural practices
- Monitoring of in situ conservation strategies required (especially for threatened species)
- Concepts & instruments for in situ conservation of CWR to be developed.

Acknowledgements

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- **Consultation**

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