



Are threatened European plant species conserved in seed banks?

A new European study has assessed whether seed banks are successfully conserving European plant species threatened by extinction. The findings indicate that threatened species are only partly conserved by seed banks, and that these facilities need to focus their future efforts on filling gaps in their collections.

Human activity has led to a significant and irreversible loss of biodiversity around the world, particularly in the past 50 years. Europe especially is suffering from this crisis, as a densely populated and urbanised region. At least 50% of vascular plants and 65% of habitat types protected under the EC Habitats Directive¹ have a poor conservation status. Climate change poses an additional threat to plants. Off-site conservation, a process of protecting endangered species outside their natural habitat, has been developed as an essential tool for protecting biodiversity. Seed banks are one example of off-site conservation, which store seeds in order to preserve species, should they be threatened in the wild. The number of off-site conservation facilities has grown dramatically in recent years, and have become increasingly integrated into national and regional initiatives. However, limited information is available about the extent to which plant species are appropriately represented in off-site collections.

The researchers used the ENSCONET² database to assess the importance of European seed banks in plant conservation. The database contains information about species that are currently stored in the 29 major native seed banks in Europe, across 17 countries. They cross-checked the database against three other sources of European threatened species data: (1.) Annex II of the EC Habitats Directive, (2.) Botanic Gardens Conservation International's (BGCI) European threatened plant list³, and (3.) the European Environment Agency's map of biogeographic regions⁴. Threat status was collated using the International Union for Conservation of Nature (IUCN) red list categories ('Critically Endangered', 'Endangered' or 'Vulnerable').

Although a significant amount of European plants (around 70%) is currently stored in seed banks, the results revealed a relatively poor representation of threatened species. They contained only 27% of the taxa ('families' of species) listed on the European threatened plant list and 44% in Annex II of the EC Habitats Directive. In addition, 24 taxa were involved in 63 different recovery programmes, but only six of them belong to the BGCI European threatened list and two to Annex II of the EC Habitats Directive.

Some taxonomical groups most at risk, such as *Pteridophytes* and *Orchidaceae*, were also under-represented in European seed banks. The low representation reflects difficulties in long-term storage, as some species do not survive well in storage, and the authors suggest more research in this area is needed.

The researchers also assessed the genetic diversity of the seed banks. They found that at least two thirds of the threatened species stored in European seed banks possibly suffer from very low genetic diversity in the collections. Furthermore, a disproportionately high number of species were from the West-Mediterranean and Atlantic regions.

The study identified gaps in present seed bank collections. A recent protocol, produced by ENSCONET, provides guidelines for making seed collections adequate, taking into consideration genetic aspects for conservation purposes. The authors believe that this can be used as a handbook to facilitate the collection of high-quality seeds across Europe and elsewhere, and will help fill existing gaps in current collections. The study's findings demonstrate that seed banks alone are not sufficient to conserve plant species and that *in situ* conservation should remain the top priority.

1. See: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
2. The European Native Seed Conservation Network (ENSCONET) was supported by the European Commission under the Sixth Framework Programme. See: <http://ec.europa.eu/research/infrastructures/pdf/ensconet.pdf>
3. See: www.bgci.org/ourwork/threatenedeurope
4. See: www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2005

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