

## Reintroductions and population reinforcements of critically endangered plant species in restored grassland habitats from Belgium

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Nutrient-poor grassland habitats and several of their characteristic plant species have reached a critical state in many European countries, including Belgium. The main reasons for this situation are: habitat fragmentation, forest recolonization due to abandonment of the traditional agro-pastoral activities, and the intensification of agricultural practices leading to eutrophication. There is now an urgent need to preserve, manage and restore these few remaining, often degraded, habitat patches. Part of this task includes the restoration of populations of critically endangered plant species that without intervention would not regenerate naturally due to restricted seed dispersal abilities and the absence of a persistent seed bank in the soil. In the framework of the EU-LIFE project “Herbages” (LIFE11 NAT/BE/001060), the Botanic Garden Meise, as a centre of excellence in ex situ conservation and plant propagation, has implemented population transplantations in the wild for four critically endangered species (*Dianthus deltoides*, *Helichrysum arenarium*, *Arnica montana* and *Campanula glomerata*). The aim is to increase the effective size of remaining populations (reinforcement) and to restore extinct populations (reintroduction) in order to improve connectivity in the landscape. For each species, seeds have been collected on a minimum of 50 individuals in two to four source populations in the closest possible similar habitats. In each source population, leaves were sampled on a minimum of 30 individuals in order to estimate population genetic diversity and structure. Soil samples were collected in the target sites to study the soil seed bank. Propagation protocols have been successfully developed for all target species. Prior to in situ transplantation, morphometric measures (vegetative plant size) were recorded on each individual. For each species, a population of 500 to 700 young individuals was transplanted in three or four different sites. Once in situ these plants were labelled and precisely mapped to facilitate their long-term monitoring. The conditions for maintaining these populations in situ were: (1) areas with legal protection status, (2) land properties of the managers (Forest Department or NGO), ad hoc management adapted to the habitat type. A demographic survey (e.g. survival, floral production, reproductive success, and population extension by clonal propagation or seedling recruitment) is recorded yearly on the field. A germination experiment is carried out to estimate the fitness of the progeny in order to test for inbreeding or outbreeding depression. First results are presented and discussed, and implications for conservation are examined.



Dr. Sandrine Godefroid is a Conservation Officer at the Botanic Garden Meise (Belgium). As a plant ecologist, she has always worked on bridging the gap between science and management. Her areas of interest include the restoration of plant communities and habitats, ex-situ conservation techniques and best practice in translocations of endangered plant species. Her review (published in *Biological Conservation* in 2011) linking the success of plant species reintroductions with the methods implemented has been an inspiration worldwide and is considered as one of the most influential papers in the field of reintroduction biology in recent years (Guerrant 2013). In her 25-year career, she has published 46 papers in international journals, and her work has been acknowledged by 5 scientific awards.