Global Reintroduction Perspectives: 2018

Case studies from around the globe

Edited by Pritpal S. Soorae

IUCN/SSC Reintroduction Specialist Group (RSG)

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The reintroduction of Yellow gentian on Mount Genziana, CE Sardinia

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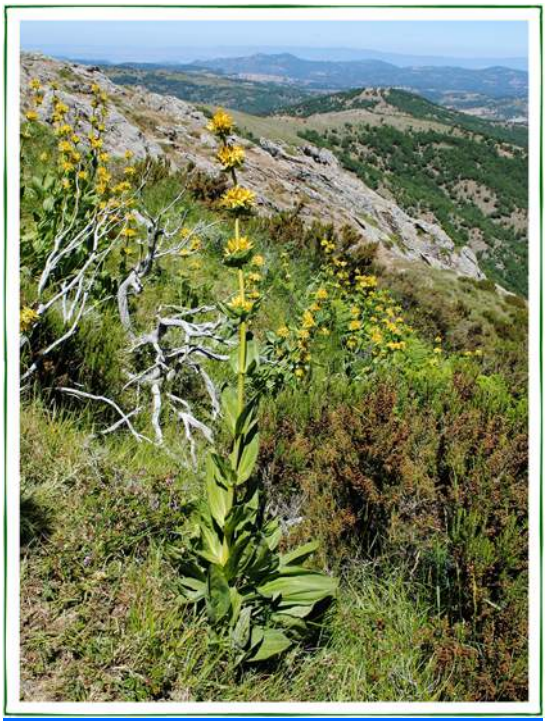
Introduction

Yellow gentian (*Gentiana lutea* L. Gentianaceae) is a long-lived, rhizomatous geophyte which develops fertile stems that generally produces new shoots in early summer, and blooms with several tens of yellow flowers; its fruits are capsules which ripen in late summer. The distribution range of *G. lutea* includes mountainous grasslands and pastures of central and southern Europe: Sardinia, Corsica, Iberian, Italian, Balcan Peninsulas and, rarely on W. Caucasus and Anatolia. *Gentiana lutea* subsp. *lutea*, the only subspecies present in Sardinia, is restricted to the Gennargentu Massif (Central-Eastern part of the island). This massif represents an independent phytogeographical sector and consists of a system of summits with four peaks at more than 1,800 m.



***Gentiana lutea* L. subsp. *lutea* in its natural habitat in Sardinia © G. Bacchetta**

The Sardinian population, that represents a southern edge of its overall distribution range, is characterized by small groups or scattered individuals. *Gentiana lutea* is listed in the Habitats Directive 92/43/EEC and, considering its restricted distribution range and its threats, mainly related to the negative effects of global warming and root harvesting, it was categorized as Near Threatened (NT) at Italian level (Rossi *et al.*, 2016). In Sardinia, where various extinction events were recorded in the last century, this taxon was considered as Endangered (EN; Fois *et al.*, 2016).

Goals

- Goal 1: To reintroduce plants in a locality where the taxon was recently extinct due to unnatural causes.
- Goal 2: To determine the conditions required for this plant reintroduction to be successful.
- Goal 3: To make the results of this project available for future plant reintroduction trials in Sardinia and, more in general, in the Mediterranean context.
- Goal 4: To examine how successful plant reintroduction has been in establishing viable, self-sustaining population in Sardinia and, more in general, in the Mediterranean context.

Translocation site © G. Bacchetta

Success Indicators

- Indicator 1: Long-term plant survival.
- Indicator 2: Plant growth and plant development patterns.
- Indicator 3: Flowering and reproduction rate of the established plants (in the mid-term).
- Indicator 4: Number of established seedlings (in the mid-term).
- Indicator 5: Number of recruited seedlings becoming reproductive (in the mid and long-term).

Project Summary

Feasibility: *G. lutea* subsp. *lutea* grows in grasslands, meadows, and clearings of beech, alders, heathers and brooms in the upper montane and (sub-) alpine pastures. The translocation has been performed after conducting an exhaustive ecological study and analysis of historical and current natural distribution ranges of this plant in Sardinia. Studies based on a presence-only distribution model and optimal geomorphological, present and future climatic conditions, identified a suitable area for a translocation in Monte Genziana (Talana), where *G. lutea* subsp. *lutea* recently disappeared due to an intensive root harvesting (Fois *et al.*, 2015). The locality chosen for this action is named “Serra Siccorruli”, located in the Monte Genziana (Talana) at an altitude of 1,425 m a.s.l. and with a slope of approximately 20%. The suitability of this area was also confirmed in field by the presence of soil, moisture and vegetation characteristics that *G. lutea* generally prefers in Sardinia. Simultaneously, the conditions for seed germination were tested in the field and in the laboratory to understand the germination behaviour and to apply the enhanced knowledge at larger scales (Cuena-Lombraña *et al.*, 2016).

Implementation: Seeds of *G. lutea* subsp. *lutea* were collected from the largest locality actually present in Sardinia in order to maximize the genetic diversity of the material. Successively, plants obtained from seeds were cultivated for 1 - 3 years in the greenhouses of the Agenzia FoReSTAS (Agenzia Forestale Regionale per lo Sviluppo del Territorio e l'Ambiente della Sardegna, Autonomous Region of Sardinia), located in the municipality of Talana, close to the selected area. Before performing the translocation, the selected area was fenced following the previous experiences in Sardinia (Fenu *et al.*, 2016). The translocation has been carried out in two periods: the first in autumn (December 2014) and the second in spring (March 2015) by using plants of different ages (100 plant of 1 year old and 100 plants of 3 years old). The translocation was firstly supported by a specific project of the Autonomous Region of Sardinia and, then, by the international project Care-Mediflora (founded by the MAVA Fundation).

Post-planting monitoring: All transplanted plants were monthly monitored from April to September recording plant growth and survival rate; flowering and reproduction of the established plants and number of new established seedlings are planned to be monitored after five years from the transplanting action. Management actions aimed to reduce the natural vegetation evolution has been periodically carried out by removing the fast-growing species in the site (e.g. *Erica arborea* L., *Rubus ulmifolius* Schott., etc.).

Preliminary results indicated a similar survival rates both for ages of plants and seasons of translocation. The higher mortality rate was observed during the first year, while this rate diminished up to zero in the next years. After three years, the survival rate was sufficiently high, with 94 plants alive (47%).

Major difficulties faced

- *Site* - the remoteness and travelling distance to get to the translocation site made the monitoring difficult and expensive.
- *Summer drought* - the Sardinian population occurs at the edge of their ecological range; the hot and dry summers desiccated plants in their first year before roots were able to grow deep enough to tap into subsoil moisture.
- *Plants* - the slow growth rate requires a very long times to correctly evaluate the outcome of reintroduction.
- *Root harvesting* - a possible risk that the transplanted plants will be destroyed for the root exploitation.
- *Management actions* - the natural evolution of the vegetation in the selected area could promote a loss of suitable habitat for the species; periodic management actions will be required to promote the effectiveness of this translocation.

Major lessons learned

- Select an appropriate area and microhabitat, something unique to each taxa, is a key feature for successful plant reintroduction.
- Choice of an area managed by a public administration: the conservation of threatened plants is more practicable than on private lands.
- To realize reintroduction with plants of different ages in order to better select and choose the individuals to carry out the future reintroduction.

- To realize reintroduction in different season in order to select and choose the appropriate season to carry out the future reintroduction.
- To realize a long-term plan monitoring to verify the effectiveness of the reintroduction and, if necessary, to adopt improved solutions.

Success of project

Highly Successful	**Successful**	Partially Successful	Failure
	√		

Reason(s) for success/failure:

- High number of survived transplants (after the first critical summer).
- Positive impact of the fence to promote plant growth and exclude grazing.
- High rate of flowering and fruiting rate (to be evaluated in the mid-term).
- High number of viable seeds produced per plant (to be evaluated in the mid-term).
- High number of new recruited seedlings (to be evaluated in the mid and long-term).

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