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IDPlanT: The Italian Database of Plant Translocation

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RAPID REPORT

IDPlanT: The Italian Database of Plant Translocation

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Abstract

IDPlanT is the Italian Database of Plant Translocation, an initiative of the Nature Conservation Working Group of the Italian Botanical Society. IDPlanT currently includes 185 plant translocations. The establishment of a national database on plant translocation is a key step forward in data sharing and techniques improvement in this field of plant conservation.

Keywords: assisted colonisation; data-sharing; plant conservation; plant reintroduction; population reinforcement; threatened plants

Introduction

Translocation, the intentional movement of species for conservation purposes (IUCN, 2013), has sharply increased in recent decades, as demonstrated by thousands of translocation projects performed worldwide, involving animals (Brichieri-Colombi & Moehrenschrager, 2016), plants (Dalrymple et al., 2012; Fenu et al. 2019) or other organisms such as fungi and lichens (Soorae, 2018, 2021). Despite the fact that translocation techniques are now popular among conservation biologists, tracking translocation outputs and methods are challenging. The main reason for this

challenge is that most translocation cases are not published in the scientific literature, because they have been implemented in the frame of practical conservation actions and are reported in the grey literature. Other reasons for the high proportion of unpublished translocation are that in many cases they have been unsuccessful, or do not address specific research questions worthy of a scientific publication (Godefroid et al., 2011). Recent initiatives like the IUCN Global Reintroduction Perspectives (e.g.: Soorae, 2016, 2018, 2021) represent useful reports of translocations. However, in this case, data are not organised in a way that can facilitate their retrieval and analysis. In this context, databases become essential to organise and provide information on translocation techniques and improve the underlying science (Godefroid & Vanderborght, 2011). Some databases with global and regional coverage are available for various organisms (e.g. TRANSLOC for Europe <http://translocations.in2p3.fr/>) and specifically for birds (Lincoln Park Zoo, 2020). Other regional and national databases are now available for plants (Vicente et al. 2017; Silcock et al., 2019; Trans-Planta <https://www.conservacionvegetal.org/bdtcpe/>), while in other countries the establishment of translocation databases is recommended (Liu et al., 2015). National databases provide important information on the conservation strategy and policy applied at the country level. In Italy, the reinforcement of *Pinus heldreichii* subsp. *leucodermis* (Antoine) E.Murray in the Pollino National Park (Calabria) is the first documented translocation, carried out in 1958 (original datum included in IDPlanT). Recently, many more translocations have been performed (see for instance the IUCN Global Reintroduction Perspectives cited above), but a national repository for Italy is still lacking, preventing conservation biologists and practitioners from benefitting from each other's experience. The main aims of this article are: 1) to announce the creation of the Italian Database of Plant Translocation (IDPlanT), an initiative of the Nature Conservation Working Group of the Italian Botanical Society and 2) to encourage its continued implementation over time.

IDPlanT structure

IDPlanT has been developed according to the most recent translocation standards (Godefroid and Vanderborght, 2011). IDPlanT will include translocation of different organisms (algae, bryophytes, lichens, fungi, and vascular plants) and all types of translocations, except for large-scale ecological restoration activities and reforestations. It contains key data for the replicability of the methods reported and for future meta-analysis (Supplementary material 1). Units (i.e., rows) represent the single translocated populations (each one referred to hereafter as a 'case'). The reason for this choice is that every translocation may differ in terms of number and type of propagules and methods of propagation, site selection procedure, release, pre- and post-release interventions, monitoring, etc. Among other information (Supplementary material 1), the database includes data on site manipulation, population aftercare and costs, which are all innovative aspects compared to other databases. Methodological variables are coupled with data concerning the percentage of plant survival, flowering, fruiting, and recruitment observed 1 year and 2 years after plant release and at the end of the monitoring period. This approach partially overcomes the limitations related to the classical declaration of success/failure provided by the authors of each case.

Current status of IDPlanT

Currently (April 2021), IDPlanT contains 185 cases collected through a survey of more than 1,000 Italian botanists, conservation biologists and practitioners, most of whom are members of the Italian Botanical Society. The cases include 117 taxa (29 Italian endemics; Bartolucci et al., 2019): one lichen (*Lobaria pulmonaria* (L.) Hoffm.), one lycophyte (*Isoetes malinverniana* Ces. & De Not.), three ferns (*Asplenium trichomanes* L. subsp. *quadrivalens* D.E.Mey., *Marsilea quadrifolia* L., *Pteris cretica* L.), three gymnosperm species (*Abies nebrodensis* (Lojac.) Mattei, *Ephedra distachya* L. subsp. *distachya*, *Pinus heldreichii* Christ subsp. *leucodermis* (Antoine) E.Murray), and 109 angiosperm species.

A total of 19 taxa are listed in the annexes of the “Habitats” Directive 92/43/EEC and/or in the Bern Convention. Moreover, 30 taxa are listed as threatened with extinction (CR, EN, VU) according to the Italian Red List (Orsenigo et al., 2018, 2021). Most translocations are population reinforcements (51.4%) followed by reintroductions (36.8%), and introductions outside the species range (11.9%, including the assisted colonisation of *Acis nicaeensis* (Ardoino) Lledó, A.P. Davis & M.B. Crespo and *Zelkova sicula* Di Pasq., Garfi & Quézel).

Most translocations were carried out in the last ten years, with a sharp increase in their number in the past two decades, compared to the previous period. Currently, the database covers a period of 62 years (from 1958 to 2020; Figure 1), and translocations are well distributed across the country, with the administrative regions Lombardy, Apulia and Sicily showing the highest number of cases reported (Figure 2).

Conclusion

The establishment of IDPlanT is expected to provide several conservation benefits. First, the database will allow conservation biologists and practitioners to share translocation techniques and outcomes, which are essential to identify best practices and avoid recurrent mistakes. Second, policy makers and other stakeholders, such as sub-national administrative jurisdictions and protected areas, will benefit from this tool for monitoring the conservation activities carried out in Italy. Third, the database will be important for the implementation of the “Habitats” Directive, as it will make conservation practices such as translocations more effective for the restoration of favourable conservation status for Italian policy species (Fenu et al., 2017), also allowing demonstration of the efforts carried out for the conservation of taxa listed in the abovementioned Directive and facilitating the periodical reporting related to the Directive. The establishment of IDPlanT plays a key role in the most recent national initiatives, such as the development of the Italian guidelines for plant translocations (Rossi et al., 2013) and the recent national law (D.M. 02-04-2020, n.98) regulating the reintroduction and reinforcement of native policy species in Italy (Gazzetta Ufficiale, 2020). This, however, does not require the establishment of a database of translocation actions.

An important aspect emerging from a preliminary analysis of the database is that only 25% of cases deal with threatened species (according to the IUCN red lists). This means that most translocations involve species that are only locally threatened or not threatened at all, at the expense of species of high conservation priority at the national or global level. On the other hand, populations of widespread taxa may be threatened or show declining trends locally. Therefore, translocation may be justified especially with taxa or populations of phytogeographic importance (e.g., marginal populations, Abeli et al. 2018). Indeed, coordination among institutions, protected area management authorities, scientists and practitioners is needed to avoid wasting resources for the translocation of species of low conservation priority. Two species (*Agrostemma githago* L. subsp. *githago* and *Piptatherum holciforme* (M.Bieb.) Roem. & Schult. subsp. *holciforme*) are considered as alien species (Galasso et al., 2018). The establishment of a national committee of experts for the evaluation of translocation project proposals before the required authorisations are released would be desirable.

Given the importance of a national data repository for plant translocation, we encourage scientists and practitioners working on plant translocation in Italy to contribute to the database. A downloadable data entry form of IDPlanT is available as Supplementary material 1. IDPlanT is managed by the Nature Conservation Working Group of the Italian Botanical Society and the University of Roma Tre, and a summarized version can be viewed at:

<https://drive.google.com/drive/folders/1ct8ZNH43Lk8KoX9wPyoO4Ad5EJm1ji9L?usp=sharing>. For enquiries, changes or the addition of new cases to IDPlanT, the Nature Conservation Working Group should be contacted.

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References

- Abeli T, Vamosi J, Orsenigo S. 2018. The importance of marginal population hotspots of cold-adapted species for research on climate change and conservation. *J Biogeogr.* 45: 977-985.
- Bartolucci F, Peruzzi L, Galasso G, Albano A, Alessandrini A, Ardenghi NMG, Astuti G, Bacchetta G, Ballelli S, Banfi E, et al. 2018. An updated checklist of the vascular flora native to Italy. *Plant Biosyst.* 152(2): 179–303.
- Brichieri-Colombi TA, Moehrensclager A. 2016. Alignment of threat, effort, and perceived success in North American conservation translocations. *Conserv Biol.* 30: 1159-1172.
- Dalrymple SE, Banks E, Stewart GB, Pullin AS. 2012. A meta-analysis of threatened plant reintroductions from across the globe Pages 31–52. In: Maschinski J, Haskins KE, editors. *Plant reintroduction in a changing climate - promises and perils*. Island Press, Washington DC. P. 31-52.
- Fenu G, Bacchetta G, Christodoulou CS, Fournaraki C, Giusso del Galdo GP, Gotsiou P, Kyratzis A, Piazza C, Vicens M, Pinna MS, et al. 2019. An early evaluation of translocation actions for endangered plant species on Mediterranean islands. *Plant Divers.* 41: 94–104.
- Fenu G, Bacchetta G, Giacanelli V, Gargano D, Montagnani C, Orsenigo S, Cogoni D, Rossi G, Conti F, Santangelo A, et al. 2017. Conserving plant diversity in Europe: outcomes, criticisms and perspectives of the Habitats Directive application in Italy. *Biodiv Conserv.* 26: 309-328.
- Galasso G, Conti F, Peruzzi L, Ardenghi NMG, Banfi E, Celesti-Grapow L, Albano A, Alessandrini A, Bacchetta G, Ballelli S, et al. 2018. An updated checklist of the vascular flora alien to Italy. *Plant Biosyst.* 152: 556-592.
- Gazzetta Ufficiale, 2020. Decreto del Ministero dell’ambiente e della tutela del territorio e del mare, 2 Aprile 2020 Criteri per la reintroduzione e il ripopolamento delle specie autoctone di cui all’allegato D del decreto del Presidente della Repubblica 8 settembre 1997, n 357, e per l’immissione di specie e di popolazioni non autoctone (20A02112). *Gazzetta Ufficiale della Repubblica Italiana Serie Generale, Anno 161, Numero 98:2*
- Godefroid S, Piazza C, Rossi G, Buord S, Stevens AD, Agurauja R, Cowell C, Vanderborgh T. 2011. How successful are plant species reintroductions? *Biol Conserv.* 144: 672–682.
- Godefroid S, Vanderborgh T. 2011. Plant reintroductions: the need for a global database. *Biodiv Conserv.* 20: 3683-3688.

IUCN (International Union for Conservation of Nature) SSC (Species Survival Commission) 2013. IUCN guidelines for reintroductions and other conservation translocations IUCN SSC, Gland, Switzerland.

Lincoln Park Zoo Avian Reintroduction and Translocation Database Available at: <http://www.lpzoo.org/ARTD> Accessed January 12, 2020.

Liu H, Ren H, Liu Q, Wen X, Maunder M, Gao J. 2015. Translocation of threatened plants as a conservation measure in China. *Conserv Biol.* 29: 1537-1551.

Orsenigo S, Montagnani C, Fenu G, Gargano D, Peruzzi L, Thomas A, Alessandrini A, Bacchetta G, Bartolucci F, Bovio M, et al. 2018. Red Listing plants under full national responsibility: Extinction risk and threats in the vascular flora endemic to Italy. *Biol Conserv.* 224: 213–222.

Orsenigo S, Fenu G, Gargano D, Montagnani C, Abeli T, Alessandrini, Bacchetta G, Bartolucci F, Carta A, Castello M, et al. 2021. Red list of threatened vascular plants in Italy. *Plant Biosyst.* 155: 310-335

Rossi G, Amosso C, Orsenigo S, Abeli T. 2013. Linee guida per la traslocazione di specie vegetali spontanee Quad Cons Natura, 28, MATTM – Ist Sup Protezione e Ricerca Ambientale (ISPRA), Roma ISSN 1592-2901.

Silcock JL, Simmons CL, Monks L, Dillon R, Reiter N, Jusaitis M, Coates DJ. 2019. Threatened plant translocation in Australia: A review. *Biol Conserv.* 236: 211-222

Soorae PS. 2016. Global Reintroduction Perspectives: 2016 Case studies from around the globe IUCN/SSC Reintroduction Specialist Group, Gland, Switzerland and Environment Agency, Abu Dhabi, UAE

Soorae PS. 2018. Global Reintroduction Perspectives: 2018 Case studies from around the globe. IUCN/SSC Reintroduction Specialist Group, Gland, Switzerland and Environment Agency, Abu Dhabi, UAE.

Soorae PS. 2021. Global conservation translocation perspectives: 2021. Case studies from around the globe. Gland, Switzerland: IUCN SSC Conservation Translocation Specialist Group, Environment Agency - Abu Dhabi and Calgary Zoo, Canada.

Vicente Moreno R, Alonso MA, Lara-Romero C, Iriando JM, García-Fernández A. 2017. Restitución de poblaciones como herramienta de conservación en España. *Conservación Vegetal* 21.

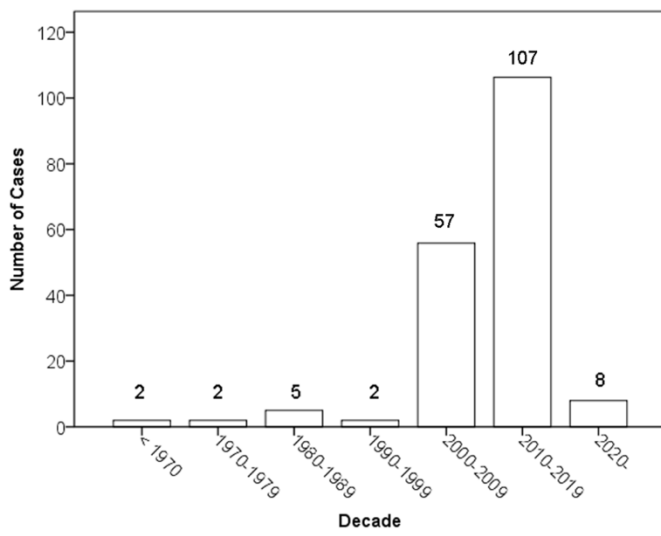


Figure 1. Number of translocations carried out in Italy since the first documented case in 1958.

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Figure 2. Geographical distribution (at the Region level) of translocations carried out in Italy. Numbers indicate the recorded cases for each region.