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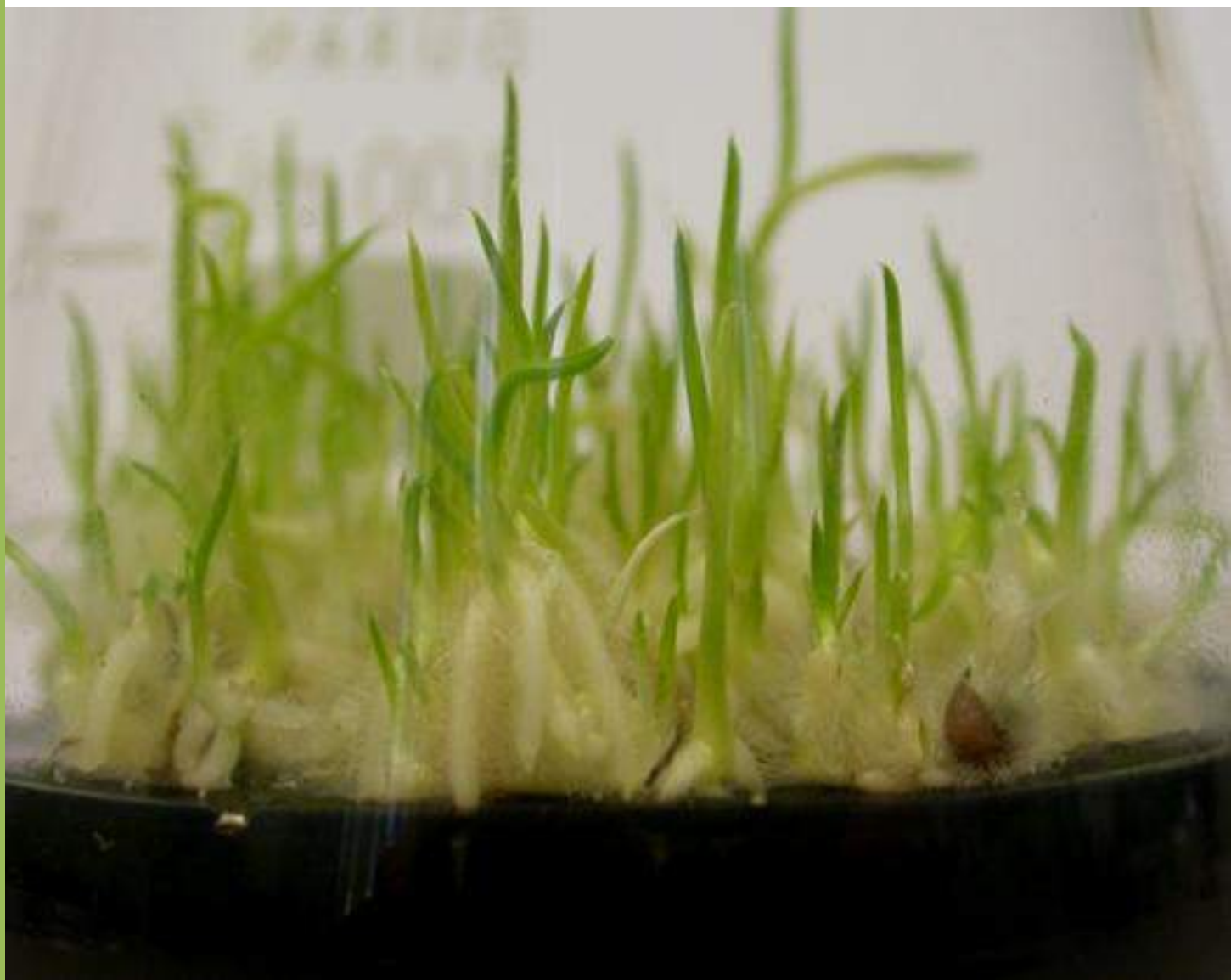
Conservation of threatened species: activities and collaborations within the network



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The Majella Seed Bank for the conservation of the endemic, rare or endangered species in Abruzzo: a tangible example of interaction between *ex situ* and *in situ* conservation

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The seed banks are generally considered a strong and effective tool for long-term biodiversity conservation (Williams et al., 2003; Mattana et al., 2005). In order to achieve this objective, the Majella National Park (MNP) has created its own seed bank in 2005, integral to the Botanical Garden 'Michele Tenore' in Lama dei Peligni (Chieti). Its task is to preserve, outside their habitat, several endemic, rare or endangered plants, as well as other species that can be utilized in restoration programs addressed to vulnerable or damaged ecosystems (e.g. burned-out areas) within the territory of the Park (Fig. 1).

Currently, the Majella Seed Bank is a reference at a regional level and is a tangible example of interaction between *ex situ* and *in situ* conservation, in the context of the Italian National Parks.

The different activities in the structure (collection, cleaning, storage, germination tests, etc.) are carried out also with the support of graduate students, trainees and volunteers, who come to the Majella thanks to cooperation agreements between MNP and various research institutions. Among these, must be mentioned:

- The Department of Medicine, Health and Environmental Sciences (M.E.S.V.A.) of the University of L'Aquila;
- The Agriculture, Environment and Food Department and the Bio-science and Territory

FIGURE 1. High part of Taranta Valley within the Majella National Park

Department of the Molise University;

- The Plant Ecophysiology Laboratory, Environmental Biology Department of 'La Sapienza' University of Rome.

The range of action of the seed bank stretches throughout the Abruzzo Region, though it is mainly focused within the MNP borders, where the rate of protected entities is very high: about 335 out of a total number of 2,100 assessed entities, 39 of which are included in the Atlas of the species under risk of extinction (Scoppola & Spampinato, 2005). Moreover, 142 entities are endemic to Italy, 47 to Abruzzo and/or Central Apennines and 5 are found only within the territory of MNP: *Pinguicula fiorii* Tammaro & Pace, *Soldanella minima* Hoppe subsp. *samnitica*, Cristof. & Pignatti (Fig. 2), *Ranunculus multidens* Dunkel, *Crepis magellensis* F. Conti & Uzunov, *Centaurea tenoreana* Willk. (Conti & Bartolucci, 2012), not considering two species of *Hieracium* because of their taxonomic problems. For this reason, the seed bank focuses its activities mainly towards the most endangered species: currently, the bank preserves germplasm of 66 species belonging to 26 families and 59 genera, most of them included in the IUCN Red Lists and protected by several International Conventions and Regional Laws (45/79 and 66/80 of the Abruzzo Region).

The conservation activities are also supported by studies addressed to identify, test and evaluate different germination protocols. Among the surveyed species must be mentioned: *Adonis distorta* Ten., *Androsace mathildae* Levier, *Aquilegia magellensis* F. Conti & Soldano, *Astragalus aquilanus* Anzal., *Athamanta macedonica* (L.) Spreng., *Campanula fragilis* Cirillo subsp. *cavolinii* (Ten.) Dambolt, *Cerastium thomasii* Ten., *Coristospermum cuneifolium* (Guss.) Bertol. [= *Ligusticum lucidum* Mill. subsp. *cuneifolium* (Guss.) Tammaro], *Ononis rotundifolia* L.,

FIGURE 2. Soldanella minima *subsp.* samnitica*, endemic species of Majella*

FIGURE 3. Phyllolepidum rupestre*, endemic to Abruzzo Apennines*

Phyllolepidum rupestre (Ten.) Trinajstic (Fig. 3), and *Soldanella minim*a Hoppe subsp. *samnitica* Cristof. & Pignatti (Fig. 2).

The number and sources of the seeds stored in the bank is steadily increasing and goes beyond the borders of the Park and of the Abruzzo region, performing a concrete conservation action of the genetic resources of spontaneous species. Some agricultural varieties that are traditional in the territory of the Park, together with some ornamental species are conserved as well.

The case study of *Astragalus aquilanus* Anzal.

This rare Fabaceae species is endemic to the central Apennines (Italy), with few populations in Abruzzo. The single population reported from Calabria needs to be confirmed. Regarding the conservation status, *Astragalus aquilanus* (Fig. 4) is included in the Red List of the Italian flora as Endangered (Rossi et al., 2013). It is a priority species in Annex II of the Habitat Directive, is protected by regional laws (Abruzzo) n. 45/79 and n. 6/80 and is classified as 'category 0':

FIGURE 4. Astragalus aquilanus*, endemic species of the central Apennines (Italy)*

Entity extremely rare, endemic and endangered, known for one or a few sites, in the list of species worthy of preservation in Abruzzo (Conti & Bartolucci, 2012).

To characterize its germination ecology, after careful morphometric measurements of the seeds under a stereomicroscope, several *in vitro* germination tests have been carried out on 1% agar medium at pH 5.7 in a sterile environment. The first results have shown a physical exogenous dormancy (seed coat impermeability to water) already observed in other species of the same genus (Miklas et al., 1987; Baskin & Baskin, 1998). The pretreatment which gave the best results for the dormancy breaking has been the chemical scarification for 20 minutes with concentrated sulfuric acid at 96%. After four replications, each on 20 seeds, we obtained a final percentage of germination of 93.8 ± 7.5 and a T_{50} of 3 days.

The propagation activity

Besides the Seed Bank, the Majella National Park carries out its conservation actions also thanks to various structures such as two Botanical Gardens and an authorized nursery dedicated to the propagation and marketing of the species. Thus, the field activities of collection, study and classification of the species result in:

- Activation of reintroduction programs carried out by the managements of the Protected Areas;
- Reduction of the collection in the wild of material for maintaining the *ex situ* collections;
- Restoration of damaged or degraded ecosystems and habitats;
- Integration and improvement of the conservation chances of endangered populations;
- Spreading the use of indigenous species, not pulled out from nature, for ornamental purposes, also with the aim of reducing the advance of alien species;
- Increasing the cultivation of indigenous healing, aromatic and dyeing plants, together with local traditional varieties of fruits and vegetables among the farmers who cooperate with the Park.

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