

# Germplasm bank of Pisa

*Angelino Carta & Gianni Bedini*

Department of Biology, University of Pisa., via L. Ghini, 56126 Pisa, Italy.  
E-mail: [acarta@biologia.unipi.it](mailto:acarta@biologia.unipi.it); [gianni.bedini@unipi.it](mailto:gianni.bedini@unipi.it)

The germplasm bank of Pisa is a scientific facility committed to the conservation of wild plant species and to conservation-related research programs. Stored collections include seeds of endangered species, endemic species, relic populations and habitat-specialist plants. The seed bank also conserves crop wild relatives that may be considered model plants in studies of ecology and physiology of seed desiccation tolerance, and a small collection of pollen grains. Its main goal is the conservation of rare, threatened, endemic or phytogeographically relevant plant *taxa* in Tuscany and more generally in the Mediterranean, including southern European mountain systems.

The project for the creation of the bank started in 1995; recently the bank has undergone extensive renovations, completed in 2013; it is currently managed by the Department of Biology of the University of Pisa and is a member of the European network of seed banks, ENSCONET. Conservation and research programs are coordinated with the Systematics and Evolution Laboratory of the Department of Biology, which allows to select populations and species to be sampled with objective criteria.



*FIGURE 1. Seed collecting in Mediterranean Temporary Ponds*

FIGURE 2. Collected seeds placed for after-ripening before the cleaning process



Currently, about 2,000 accessions are preserved for a total of over 200 *taxa*. In addition to the material stored as seed or pollen grain, many *taxa* are propagated in the laboratory from the field-collected material and then conserved *in vivo*.

The bank collaborates with several institutions engaged in the conservation of plant biodiversity in the Mediterranean and Europe. Research projects are carried out in agreement with protected areas and other national or international research institutions, among which Royal Botanic Gardens Kew (UK), Plantentuin Meise (Belgium), Department of Botany, University of Athens (Greece), Department of Biological, Geological and Environmental Science, University of Catania (Italy), Centro Conservazione Biodiversità, University of Cagliari (Italy).

Currently, the main research lines are the following:

- germination and evolution of Mediterranean geophytes (*Allium*, *Crocus*, *Ornithogalum*, *Romulea*)
- germination photo-inhibition in Mediterranean and Temperate plants
- germination ecology and seed storage in Mediterranean Temporary Ponds
- effect of breeding system on seed dormancy and germination
- translocation activities of aquatic and wetlands plants in Tuscan Protected areas
- collection, conservation and study of psammophilous populations
- conservation of endemic *taxa* from Apuan Alps, Apennines and Tuscan Archipelago
- collection, storage and biosystematics of European woody species

The plans and internal design of the bank have been drawn upon expert advice from staff of the Millennium Seed Bank, Kew, boasting forty years of experience in the field of native seed conservation. Currently, the bank consists of a drying room with storage cabinets, and laboratories of post-ripening, cleaning, and germination. The relative humidity of the drying room is kept at 15% by a Munters M120 dryer, while a refrigerating unit ensures that temperature is kept at 15°C. Storage cabinets are kept at -20°C to allow for long-term storage of seeds.



FIGURE 3. Release into the habitat of material propagated in the seed bank

Tools and equipment include: portable water activity meter (Rotronic); calibrated stainless sieves to clean and sort seeds; a blower to clean seeds in a current of air; a device for heat-sealing aluminum laminate bags used to store seeds; temperature- and light-controlled incubators for germination. A deep-freezer unit is available to store pollen grains at  $-80^{\circ}\text{C}$ .

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