

The Forest Seed Bank of the Generalitat Valenciana

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Summary

The objectives of The Forest Seed Bank of the Generalitat Valenciana, as a tool for forest management and genetic resources conservation, are presented.

Institutional framework

The Forest Seed Bank of the Generalitat Valenciana (Valencian Regional Government) belongs to the Direcció General de Gestió del Medi Natural (State Office for Environmental Management). It was set up in 1994 to supply seeds of the most commonly used taxa to reforestation programs carried out by the Valencian Forestry Commission (the region incorporating the provinces of València, Castelló and Alacant).

Objectives

During its existence, over the last 10 years, the commitments of The Forest Seed Bank within the forest management have increased. These objectives can be summarised as follows:

1. Provision of Forest Reproductive Material to forestation and habitat restoration activities. Our basic function is to ensure the provision of fruits, seeds and parts of plants to official forest nurseries. In some cases seeds delivered are pre-treated. Since last year we have also supplied seedlings of some species, particularly from taxa that are difficult to germinate. At present we can offer FRM of around 450 taxa from different provenances.

The seed bank also offers recommendations about the choice of species and origins, taking into account conservation of genetic resources principles, geobotanical criteria and the biodiversity promotion. The taxa recommended for use are keystone species that play an important role in the dynamic of the ecosystem and the protection of the physical environment. One other rule we assume is the choice of autochthonous taxa in the area being worked on, and, within these, those that are widely distributed or that have local natural populations with a large population size. In all cases we recommend the local origin, and if possible FRM collected from populations geographically close to the area under restoration. In many cases the seed bank carries out "made to measure" collections for specific actions, specifically when management of some interesting populations includes an increase in the census number, where FRM of the same population is used. We do not recommend the use of species that, though neither rare nor threatened, require special protection measures; in particular in areas where there are natural populations of the species, because of the danger of modifying without criteria, the genetic structure of the populations. It is inadvisable to use exotic species that can hybridise with taxa present in the area.

2. Conservation of Forest Genetic Resources. This second objective encompasses specific work for genetic resources conservation of various taxa (see Table 1). More specifically these are:

Conservation of orthodox seed lots at medium term, at 4°C, includes their periodic characterisation and also the perfection of germination methods in order to ensure a massive production of plants in nursery.

Another measure carried out for *ex situ* conservation is the installation of plantations. These are plantations with the multiple aims of producing forest reproductive material and conserving genetic resources. In some cases they are tests where we carry on studies related to adaptative traits and interesting quantitative characteristics. In this section we include clonal banks of riparian taxa, like species belonging to the genera *Tamarix*, *Salix*, *Populus* and *Ulmus*, and also clonal banks and provenance or progeny test of *Pinus* species.

Two years ago we began working in *in situ* conservation of some populations due to their singularity, scarcity or typicity. These populations are being characterised and recommendations of silviculture measures for their appropriate management are advised. At present we carry out studies in *Quercus suber*, *Taxus baccata* and *Ulmus glabra* populations.

3. Control system of the movement of forest reproductive material. The Seed Bank is responsible for the control systems of the forest reproductive material in the framework of the Council Directive 1999/105/EC and the related Spanish and Valencian legislation. The seed bank is the certification authority to ensure the origin and genetic and exterior quality of the reproductive materials collected in the Valencian Region.

Among the tasks involved in applying these regulations we would like to highlight the following: The seed bank selects and approves the basic materials of the forest species that are listed in the legislation. Technical reports and recommendations regarding collections made by private suppliers is given.

4. Others. Another important aspect of the Centre is its support of research groups and universities by providing FRM and offering installations and maintenance of experimental plantations as well as supporting student training and supervision of projects.

Table 1. Taxa included in the programme of conservation (*taxon already conserved in the seed bank)

<i>Acer campestre</i> L.	<i>Colutea breviaolata</i> Lange
<i>Acer monspessulanum</i> L.	* <i>Colutea hispanica</i> Talavera & Arista
* <i>Acer opalus</i> Miller subsp. <i>granatense</i> (Boiss.) Font Quer & Rothm.	* <i>Coriaria myrtifolia</i> L.
* <i>Amelanchier ovalis</i> Medick	<i>Corylus avellana</i> L.
* <i>Ammophila arenaria</i> subsp. <i>arundinacea</i> H. Lindb. f.	* <i>Cornus sanguinea</i> L. subsp. <i>sanguinea</i>
* <i>Anthyllis cytisoides</i> L.	* <i>Coronilla juncea</i> L.
* <i>Arbutus unedo</i> L.	<i>Cotoneaster granatensis</i> Boiss.
* <i>Arctostaphylos uva-ursi</i> (L.) Spreng	<i>Cotoneaster tomentosus</i> (Aiton) Lindl.
* <i>Atriplex halimus</i> L.	* <i>Crataegus granatensis</i> Boiss. –
<i>Berberis hispanica</i> subsp. <i>seroi</i> (O. Bolòs & Vigo) Rivas Mart. & al.	* <i>Crataegus monogyna</i> Jacq.
<i>Berberis hispanica</i> Boiss. & Reuter subsp. <i>hispanica</i>	* <i>Crithmum maritimum</i> L.
* <i>Brachypodium phoenicoides</i> Roem. & Schult.	* <i>Crucianella maritima</i> L.
* <i>Brachypodium retusum</i> (Pers.) P. Beauv.	* <i>Cyperus mucronatus</i> (L.) Mabille
<i>Bupleurum fruticosum</i> L.	* <i>Cytisus scoparius</i> subsp. <i>reverchonii</i> (Degen & Hervier) Rivas Goday & Rivas Mart.
* <i>Buxus sempervirens</i> L.	<i>Cytisus villosus</i> Pourr.
* <i>Cakile maritima</i> Scop. subsp. <i>maritima</i>	* <i>Daphne gnidium</i> L.
<i>Calicotome spinosa</i> (L.) Link	<i>Daphne laureola</i> L.
<i>Calluna vulgaris</i> (L.) Hull	* <i>Daphne oleoides</i> subsp. <i>hispanica</i> (Pau) Rivas Mart.
* <i>Calystegia soldanella</i> (L.) R.Br.	* <i>Dorycnium hirsutum</i> (L.) Ser.
* <i>Centranthus ruber</i> (L.) DC.	* <i>Dorycnium pentaphyllum</i> Scop.
* <i>Chamaerops humilis</i> L.	* <i>Echinophora spinosa</i> L.
* <i>Cistus albidus</i> L.	* <i>Elymus farctus</i> (Viv.) Runemark ex Melderis
* <i>Cistus clusii</i> Dunal subsp. <i>clusii</i>	<i>Ephedra fragilis</i> Desf. subsp. <i>fragilis</i>
<i>Cistus creticus</i> L.	* <i>Erica arborea</i> L.
<i>Cistus crispus</i> L.	<i>Erica erigena</i> R. Ross
<i>Cistus ladanifer</i> L. subsp. <i>ladanifer</i>	<i>Erica multiflora</i> L.
<i>Cistus laurifolius</i> L.	<i>Erica scoparia</i> L.
<i>Cistus monspeliensis</i> L.	<i>Erinacea anthyllis</i> Link subsp. <i>anthyllis</i>
<i>Cistus populifolius</i> L. subsp. <i>populifolius</i>	* <i>Eryngium maritimum</i> L.
* <i>Cistus salviifolius</i> L.	* <i>Fraxinus angustifolia</i> Vahl.
* <i>Clematis flammula</i> L.	* <i>Fraxinus ornus</i> L.
* <i>Clematis vitalba</i> L.	<i>Genista hispanica</i> L. subsp. <i>hispanica</i>
* <i>Colutea arborescens</i> L.	* <i>Glaucium flavum</i> Crantz
	* <i>Hammada articulata</i> (Moq.) O. Bolòs & Vigo
	<i>Helianthemum squamatum</i> (L.) Dum. Cours.

<i>Helichrysum stoechas</i> (L.) Moench
* <i>Hormatophylla spinosa</i> (L.) Küpfer
* <i>Iberis carnosa</i> Willd. s.l.
<i>Iberis saxatilis</i> L. s.l.
* <i>Ilex aquifolium</i> L.
* <i>Jasminum fruticans</i> L.
<i>Juglans nigra</i> L.
<i>Juglans regia</i> L.
<i>Juniperus communis</i> L. subsp. <i>communis</i>
<i>Juniperus communis</i> subsp. <i>hemisphaerica</i> (C. Presl.) Nyman
* <i>Juniperus oxycedrus</i> subsp. <i>macrocarpa</i> (Sm.) Ball.
* <i>Juniperus phoenicea</i> L. subsp. <i>phoenicea</i>
* <i>Juniperus sabina</i> L.
* <i>Juniperus thurifera</i> L.
* <i>Lagurus ovatus</i> L.
<i>Laurus nobilis</i> L.
* <i>Ligustrum vulgare</i> L.
* <i>Lonicera implexa</i> Aiton
* <i>Lonicera pyrenaica</i> L.
<i>Lonicera xylosteum</i> L.
* <i>Lotus creticus</i> L.
* <i>Lotus cytisoides</i> L.
* <i>Lygeum spartum</i> L.
* <i>Malcolmia littorea</i> (L.) R.Br.
<i>Malus sylvestris</i> (L.) Mill.
* <i>Medicago citrina</i> (Font Quer) Greuter
* <i>Medicago marina</i> L.
* <i>Mesembryanthemum crystallinum</i> L.
<i>Myrtus communis</i> L.
* <i>Nerium oleander</i> L.
<i>Olea europaea</i> subsp. <i>sylvestris</i> (Mill.) Rouy ex Hegi & Berger
<i>Ononis aragonensis</i> Asso
* <i>Ononis ramosissima</i> Desf.
<i>Ononis tridentata</i> L. subsp. <i>tridentata</i>
<i>Osyris alba</i> L.
* <i>Osyris lanceolata</i> Hochst. & Steud.
* <i>Otanthus maritimus</i> (L.) Hoffmanns. & Link
* <i>Pancratium maritimum</i> L.
* <i>Periploca laevigata</i> subsp. <i>angustifolia</i> (Labill.) Markgraf
* <i>Phillyrea angustifolia</i> L.
* <i>Phillyrea latifolia</i> L.
<i>Phillyrea media</i> L.
* <i>Pinus halepensis</i> Mill.
* <i>Pinus nigra</i> subsp. <i>salzmannii</i> (Dunal) Franco
* <i>Pinus pinaster</i> Aiton
* <i>Pinus pinea</i> L.
* <i>Pinus sylvestris</i> L.
* <i>Pistacia lentiscus</i> L.
* <i>Pistacia terebinthus</i> L.
* <i>Plantago crassifolia</i> Forssk.
<i>Polygonum maritimum</i> L.
<i>Populus alba</i> L. s.l.
<i>Populus nigra</i> L.
<i>Populus tremula</i> L.

<i>Populus x canescens</i> (Aiton) Sm.
* <i>Prunus mahaleb</i> L.
<i>Prunus prostrata</i> Labill.
* <i>Prunus spinosa</i> L.
<i>Quercus coccifera</i> L.
<i>Quercus faginea</i> Lam. subsp. <i>faginea</i>
<i>Quercus ilex</i> L. s.l.
<i>Quercus pyrenaica</i> Willd.
<i>Quercus suber</i> L.
* <i>Rhamnus alaternus</i> L.
* <i>Rhamnus alpinus</i> L.
* <i>Rhamnus lycioides</i> L. subsp. <i>lycioides</i>
* <i>Rhamnus saxatilis</i> Jacq.
<i>Ribes alpinum</i> L.
<i>Ribes uva-crispa</i> L.
* <i>Ruscus aculeatus</i> L.
<i>Salix alba</i> L. s.l.
<i>Salix atrocinerea</i> Brot.
<i>Salix eleagnos</i> Scop.
<i>Salix fragilis</i> L.
<i>Salix purpurea</i> L. s.l.
<i>Salix tarraconensis</i> Pau ex Font Quer
<i>Salix triandra</i> L.
* <i>Salsola genistoides</i> Juss. ex Poir.
* <i>Salsola oppositifolia</i> Desf.
* <i>Sarcocornia fruticosa</i> (L.) A.J. Schott
<i>Smilax aspera</i> L.
* <i>Sorbus aria</i> (L.) Crantz
* <i>Sorbus domestica</i> L.
* <i>Sorbus torminalis</i> (L.) Crantz
<i>Sporobolus pungens</i> (Schreb.) Kunth
<i>Stipa tenacissima</i> L.
* <i>Suaeda vera</i> Forssk. ex Scop.
<i>Tamarix africana</i> Poirét
<i>Tamarix boveana</i> Bunge
<i>Tamarix canariensis</i> Willd.
<i>Tamarix dalmatica</i> Baum
<i>Tamarix gallica</i> L.
<i>Tamarix parviflora</i> DC.
* <i>Taxus baccata</i> L.
<i>Teline patens</i> (DC.) Talavera & P.E. Gibbs
<i>Teucrium dunense</i> Sennen
<i>Teucrium libanitis</i> Schreb.
<i>Thymelaea hirsuta</i> (L.) Endl.
* <i>Tilia platyphyllos</i> Scop. subsp. <i>platyphyllos</i>
* <i>Ulmus glabra</i> Huds.
* <i>Ulmus minor</i> Mill.
<i>Vaccinium myrtillus</i> L.
* <i>Viburnum lantana</i> L.
* <i>Viburnum tinus</i> L.
<i>Withania frutescens</i> (L.) Pauquy