

Neglected Plant Genetic Resources with a Landscape and Cultural Importance in Spain

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Spain is one of the richest Mediterranean countries in plant genetic resources. According to data extracted from *Flora Europea* (Tutin *et al.*, 1964), the flora of the Iberian Peninsula (Portugal and Spain) includes 15 endemic genera and 986 endemic species of which 684 present only in Spain. These data exclude the rich flora of the Spanish Mediterranean islands (César Gómez Campo, 1985).

From Spain four different centers involved in plant genetic resources activities have been contacted for this Consultation Meeting.

- 1) The Instituto Valenciano de Investigación Agraria, situated in the Spanish Mediterranean Coast and specialized in field conservation of fruit plants, was represented by Dr. Gerardo Llacer, the speaker in our country presentation.
- 2) The Departamento de Biología Vegetal de la Universidad politecnica de Madrid, situated in the centre of Spain and specialized in seed conservation of wild species, was represented by Dr. Itziar Aguinagalde.
- 3) The Instituto de Agricultura Sostenible, situated in the south of Spain, was represented by Dr. María José Suso that works in Characterization, evaluation and breeding of legume species.
- 4) The Centro the Recursos Fitogenéticos, situated in Madrid and specialized in Conservation of Plant Genetic Resources of Agronomic interest, was represented by Dr. Celia de la Cuadra.

The proposals brought forward by each center are summarized in this report.

1. Fruit trees species

Regarding to preservation of plant genetic resources, the Valencian Institute for Agricultural Research (IVIA) is involved in a project supported by the European Union titled "Conservation, evaluation, exploitation and collection of minor fruit tree species" which include the following species:

● *Collected species*

Ficus carica (Fig)

Punica granatum (Pomegranate)

Diospyros kaki (Japanese persimmon)

Eriobotrya japonica (Loquat)

Opuntia ficus-indica (Prickly pear)

Cydonia oblonga (Quince)

Castanea sativa (European chestnut)

Pistacia vera (Pistachio)

● *Uncollected species*

Morus spp. (Mulberry)

Ceratonia siliqua (Carob tree)

Crataegus azarolus (Azerole)

Mespilus germanica (Medlar)

Arbutus unedo (Strawberry tree)

Cornus mas (Cornelian cherry)

Zizyphus vulgaris (Jujube)

Sorbus domestica (Service tree)

The main objective of this project is to establish through a common strategy a basis for the conservation and utilization of minor fruit tree species of the Mediterranean basin.

2. Other tree species with landscape and cultural importance

The Plant Species Protection Service of IVIA is also involved with these other tree species, most of which are also of interest in many other regions of Spain.

Pinus sylvestris, *P. nigra*, *P. pinea*, *P. pinaster*, *P. halepensis* (pines)

Juniperus thurifera (savin)

Quercus ilex (*Q. rotundifolia*), *Q. faginea*, *Q. coccifera*, *Q. suber*

Populus alba, *P. nigra* var. *italica*, *P. ephratica* (poplars)

Cupressus sempervirens (cypress)

Fraxinus ornus (ash)

Celtis australis

Ulmus minor (elm)

Taxus baccata (yew-tree)

Ilex aquifolium (holly-tree)

Pistacia terebinthus (terebinth)

Stipa tenacissima (esparto-grass)

Salix viminalis (willow)

Chamaerops humilis (dwarf palm)

Argania spinosa

Crataegus azarolus (azarole)

Sorbus domestica (Service tree)

Zizyphus jujuba (jujube)

Mespilus germanica (medlar)

Morus alba, *nigra* (mulberry)

Prunus mahaleb

Ficus carica (fig)

Punica granatum (pomegranate)

Dictamnus hispanicus (Spanish dittany)

Thymus moroderi (wild thyme)

3. Specific sites suggested

The Environment Preservation Service of IVIA has listed the following "specific sites which could be suggested for their beauty and historical interest across the Valencian Community". Most of these sites are described in small booklets where location, traditional activities of humans, flora and fauna, and recommended for visits are explained.

Site	Species to observe
Tinença de Benifassar	Quercus
Vilafranca	Fruit trees in dry lands
Penyagolosa	Pines and Quercus
Espadà, Calderona, Desert de les Palmes	Quercus, cherries, olives, dwarf palms
Racó d'Ademòs	Old apple trees, Juniperus
Aiora - Cofrents/Alt Tàrrida	Pines
Les Valls (Gallinera, Ebo, etc)	Fruit trees in dry lands
Font Roja, Mariola, Aitana	Quercus, aromatic plants
Elx, Crevillent, Oriola	Phoenix dactylifera, pomegranates
Montgó	Quercus coccifera, Pistacia lentiscus
Penyal D'Ifac	Juniperus, dwarf palms, Pinus halepensis, Pistacia lentiscus)
Albufera	Hydrophile and halophile vegetation
Prat de Cabanes, Torreblanca	Hydrophile and halophile vegetation
Torrevel·la, Santa Pola y El Fondó	Hydrophile and halophile vegetation

4. Mediterranean floristic relicts

Sierra Morena range is a Spanish region where it is possible to find very small local areas with so extremely high plant diversity that could be considered as a "museum" of typical Mediterranean elements. Such a museum is to visit near the Puertollano city (province of Ciudad Real); over 100 m² grows up a mosaic of at least 30 different true shrubs and some associated trees. This number could rise to 60 if herbaceous annual plants are taken also into account.

Preservation and sustainable use of this area and similar ones which probably exists in Sierra Morena is a very important goal, because of their significant landscape value.

Species found in this area is presented in the following list:

Sedum gypsicola
Erodium laciniatum
Thapsia villosa
Helianthemum squamatum
Iberis pectinata
Lepidium subulatum
Mathiola fruticulosa
Arenaria algarbiensis
Gypsophila struthium
Herniaria cinerea
Centranthus calcitrapa
Antirrhinum graniticum
Bellardia trixago
Teucrium capitatum
Thymus lacaitae
Thymus zygis
Campanula fastigiata
Atractylis cancellata
Centaurea hyssopifolia
Launaea resedifolia
Picnemon acarna
Bromus tectorum
Gaudinia hispanica
Lygeum spartum
Phragmites australis
Stipa lagascae
Stipa tenacissima
Trisetaria panicea
Allium roseum

5. Flora in Gypsaceous areas

The Iberian Peninsula is a Mediterranean area very rich in endemic plants, over one thousand are reported on its soil. It could be estimated that at least 60% of this flora grows up on mountain areas and 20% are recorded from coastal habitats. The remaining 20% are continental, distributed on humid areas or steppes. An important group of these steppe species are adapted to gypsum-deposit soils.

Gypsaceous areas are abundant in the East of Spain, although rare in other parts of Europe.

They could be interesting "living itineraries" for visiting some gypsum-deposit soils near Madrid and to know the characteristic flora adapted to this substrate.

Some significant plants growing in the proposed areas are included in the following list. These plants are very value for soil restauration on gypsaceous substract.

Juniperus oxycedrus
Quercus coccifera
Quercus faginea
Quercus ilex
Quercus pyrenaica
Quercus suber

Sedum arenarium
Sedum fosterianum
Crataegus monogyna
Pyrus bourgaeana
Rosa canina
Rubus ulmifolius
Sanguisorba minor
Astragalus lusitanicus
Cytisus scoparius
Genista hirsuta
Retama sphaerocarpa
Trifolium angustifolium
Trifolium arvense
Trifolium campestre
Trifolium stellatum
Vicia benghalensis
Myrtus communis
Pistacia lentiscus
Pistacia terebinthus
Peonia broteroi
Acer monspessulanum
Rhamnus alaternus
Hypericum perforatum
Cistus albidus
Cistus crispus
Cistus ladanifer
Cistus laurifolius
Cistus populifolius
Halimium atriplicifolium
Halimium umbellatum
Eruca vesicaria
Reseda undata
Arbutus unedo
Erica arborea
Erica australis
Erica mospeliensis
Erica scoparia
Daphne gnidium
Rumex acetosella
Paronychia argentea
Centaurium erythraea
Nerium oleander
Vicetoxicum nigrum
Olea europaea
Phillyrea angustifolia
Phillyrea latifolia
Lonicera implexa
Viburnum tinus
Scabiosa stellata
Rubia peregrina
Digitalis purpurea
Parentucellia viscosa
Lavandula stoechas
Phlomis lychnitis
Rosmarinus officinalis
Thymus mastichina
Carduus tenuiflorus
Carlina corymbosa
Chamaemelum nobile
Chondilla juncea
Helichrysum stoechas
Leuzea conifera

Scirpus holoschoenus
Cynosurus elegans
Holcus setiglumis
Melica ciliata
Vulpia ciliata
Chamaerops humilis
Asphodelus ramosus
Smilax aspera
Urginea maritima

6. An Example of evolution on action

Four taxa belonging to the genus *Coincya* (Brassicaceae family) show a good example of natural evolution, useful for didactic purposes (Gomez-Campo, 1977).

This group occupies a geographical area of 180 Km from east to west in Sierra Morena range.

C. monensis is recorded on the western part of this area, although it has a wider distribution along other mountain ranges and could represent, with its less specialized characters, the ancestral form, from which the other taxa evolved across the Sierra Morena range. *C. monensis* behaves as an annual plant in which the beak represents 1/3 of the silique length, but there is a gradual increase in this proportion in populations towards the east.

C. longirostra runs eastwards throughout rupicolous places. It shows pendent siliques and a beak larger than the valvar portion in fruit.

C. rupestris subsp. *leptocarpa* runs through small sierras on the plateau north of the main Sierra Morena range and *C. rupestris* grows only on the east part. It is the only member of the group which occupies a calcareous substratum. These two taxa show shorter fruits and a broader beak, together with a relative increase in the length of the beak.

The existence of several populations where the fruit characters are intermediate to those described above, provides additional support to the drawn evolutionary trend and suggests that such evolution has been a recent event.

A three-day itinerary from Madrid could be enough to observe the main features of this evolving group with a visit to at least ten selected localities.

Another value of this group is that *C. rupestris* was used in the past as mustard flavour due to its hot taste.

7. Crops with cultural importance

The Centro de Recursos Fitogenéticos (CRF-INIA) is a Plant Genetic Resources Center that depends on the Agriculture, Food and Fishing Ministry.

CRF-INIA has the Central Base Seedbank and is the Documentation Centre of the Spanish PGR network, possesses active collections of cereals, legumes and industrial crops, is a Center for technological advice in seed conservation subjects and owns field conservation collections as aromatics, ornamental and poplar species.

Spanish crops and traditional localities have been always an important source of inspiration for artists.

An important area is the one situated along the road used by Don Quijote (famous character in Cervantes's Novels), the most emblematic character personage of Spanish literature who has inspired generations of artists.

It is possible to see representative crops in very interesting itineraries, wheat and grape in "La Mancha", with possibility to accommodate students in *ad hoc* classrooms.

In the Centre, collections of some accessions of the species *Medicago arborea*, *M. strasseri*, *M. citrina* (higher treated), *Colutea istria*, *C. cilica*, *C. atlantica*, *C. arborescens*, *Dorycnium pentaphyllum*, *D. hirsutum* and *Hipocrepis balearica* are been characterized and evaluated for resistance to abiotic stress.

They are plants that can have a high ornamental impact in the landscape most of all in highway, road borders and artificial ramps and with beneficial effect for the soils.

Possibilities to see field collections and the effect in roads and ramps in the area.

Possibility to see still some crops, such as *Salix fragilis* (Wicker) and *Stipa tenacissima* (Esparto Grass) in Cuenca, and relate them to traditions and crafts into a geographical area with very interesting geological formations and landscapes.

In the Centre there is a big active collections of neglected legumes species, wich includes *Lathyrus sativus*, *L. cicera* and wild species related. All the accessions are multiplied and characterized; ancient recipes are available.

The *Eruca* spp. are increasing in their use as food and in the pharmaceutical industry. They are been characterized in the Centre in collaboration with Dr. César Gómez Campo from High Technical School of Agriculture of Madrid. It is possible to organize a living itinerary in a castle rute.

8. Priority for conservation of plant genetic resources in the Mediterranean Region

There are special places where some species must be collected and preserved in order to avoid their serious genetic erosion. These places are under intense disturbance from human activities.

These species can be classified in three types:

- Species of coastal distribution. Here species can be found with high level of genetic erosion due to turistic activities.
- Species growing along riversides. Riversides are changing continuously due to human intervention.
- Species distributed on the margins of cultivated fields. These species are in a dangerous situation as a result of the changes occurring in modern agriculture.

References

- Gómez-Campo, C. 1977. Climal variation and evolution in the *Hutera-Rhynchosinapsis* complex of the Sierra Morena (South-Central Spain). Bot. Journ. Linnean Society, 75:119-140.
- Gómez-Campo, C. 1985. The conservation of Mediterranean plants: principles and problems. In Plant Conservation in the Mediterranean Area (Gómez-Campo, C., ed.). Dr. W. Junk Publishers.
- Tutin, T.G., V.H. Heywood, N.A. Burges, D.H. Valentina, S. Waleters and D.A. Webbs, eds. 1964. Flora Europea. Cambridge University Press.