

PRIORITY HABITAT RESTORATION: MEDITERRANEAN TEMPORARY POND

P. PABLO FERRER¹, INMA FERRANDO¹, ELENA ESTRELLÉS², FRANCISCO MARCO², ANTONI MARZO¹ & EMILIO LAGUNA¹

¹ Centro para la Investigación y Experimentación Forestal -CIEF- de la Generalitat Valenciana. Comarques del País Valencià, 114. Quart de Poblet, València. E-46930. Valencia. flora.cief@gva.es.
² Jardín Botánico de la Universidad de Valencia C/ Quart, 80 E-46008.Valencia.



INTRODUCTION

In the framework of EC's Interreg IIIB MEDOCC initiative, the project SEMCLIMED (Climate Change Impacts on the Mediterranean flora and restoration actions) is devoted to the study of the impacts of new climatic conditions produced by climate change on some wild flora of the Mediterranean basin. This project, carried out 16 partners from different Mediterranean countries (table 1 and figure 1), is coordinated by the Research and Experimentation Forestry Centre of the Generalitat Valenciana (CIEF). The so-called 'phase IV' of SEMCLIMED, focused on field actions, includes the restoration of the Mediterranean temporary pond 'Lavajo de Arriba' (Sinarcas, province of Valencia) (figure 2) to be developed by the CIEF and the Botanic Garden of the University of Valencia. Since 2001 this site is strictly protected as a plant micro-reserve. During 2007 and 2008, the structural base of the habitat was evaluated (Ferrer, 2006), structural species were selected and a recovery programme was developed, including the collection, characterization and storing of seeds and spores in germplasm banks, as well as the production of new plantlets to go on with the restoration activities (Grootjans & van Diggelend, 1995). Simultaneously, civil work-modification of the current topographic profile is needed, in order to recover the ancient aspect of this site.

MATERIAL AND METHODS

In order to analyze the structural base of the "temporary pond" habitat, studies of the plant communities were carried out to identify which species are important for the structure, the functionality and the singularity of this habitat. These studies were based primarily on the principles of sinecology and autoecology, the dynamics and development of the communities, assembly rules, physiognomy, and the function of these species in the ecosystem (figure 3).

This research has allowed us to establish a work scheme so as to set priorities in the collection and conservation of the reproductive material in seed banks that participate in the management of natural habitats

Once the structural base was established, experts from different countries responsible for the management of temporary ponds met in Valencia to discuss the most suitable structural species for the action of restoration. Finally is recognized these structural species.

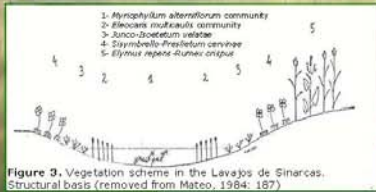


Figure 3. Vegetation scheme in the Lavajos de Sinarcas. Structural basis (removed from Mateo, 1984: 187)



Figure 1. Semclimed partners

Table 1. SEMCLIMED partners

Country	Region	Institution
Spain	Valencia	Centre d'Investigació i Experimentació Forestal Generalitat Valenciana. n° 6. Chief de File
		Jardín Botánico, Universidad de Valencia. n° 14
	Barcelona	Institut / Jardín Botánico de Barcelona. n° 7
	Murcia	Direcció General del Medi Natural de la Regió de Murcia. n° 11
	Balearic Island, Mallorca	Fundació Jardín Botánico de Sóller. n° 8
France	Provence / Alpes Costa Azur	Conservatoire Botanique National Méditerranéen de Porquerolles. n° 1
		Conservatoire Dendro des Ecosystemes de PACA. CIEF. n° 3
	Languedoc-Roussillon	Conservatoire des Espaces Naturels de Languedoc-Roussillon. CEN-ER. n° 2
Greece	Athens	National and Kapodistrian University of Athens. n° 16
	Crete	Mediterranean Agronomic Institute of Chania. MAICh. n° 10
Syria	University of Catania, Dipart. Di Botanica (Siria). n° 12	
Italy	Sardinia	Centro Conservazione Biodiversità, Università di Cagliari. n° 4
Malta	Malta	Università n° Malta-Argenti Herbarium and University Botanic Gardens. n° 13
Tunisia	Médénine	Institut des Régions Arides. Laboratoire d'Ecologie Pastoral n° 8
Morocco	Rabat	Institut Scientifique de Rabat. n° 9
Egypt	Al-Dahaklyia, Mansour	Université de mansour. Faculté de Sciences. n° 15

Seeds, spores and other material of reproduction of the structural species were collected. In partners centres laboratories the lots were characterized (cleaning impurities, tests of viability, tests of germination and so on). Assay pre-treatment were scarification, cold stratifying, used of alternating temperature cycle, smoke, hormones cultivated (giberelline, 100-1000 ppm), high nitrate concentration, damaged seminal cover and different luminance conditions (Baskin *et al.*, 1996).

Using different propagation techniques (table 2) were obtained plants cultivated in different containers types (according to the species) but the same substrate type (black peat : perlite ; 7:1) (Brown & Bedford, 1997; Budelsky & Galatowitsch, 2000).

In addition, sods were made from the top layer of the field (covering) (it is obtained a bank of seeds) in areas affected and altered as a result of the future civil work-modification to restoration (Middelton, 1999)
 Plants were kept in greenhouses for a growth period and then transferred to other sites in order to acclimatize.

These actions were carried out by the CIEF, the Botanic Garden of the University of Valencia and the Research and Experimentation aquatic plants and fish-farm Centre El Palmar, Valencia.



Figure 2. Microreserve Lavajo de arriba Sinarcas, Valencia (Spain)



Meeting of main mediterranean temporary pond experts, Sinarcas (Valencia)



Removing seeds, Sinarcas (Valencia)



RESULTS AND CONCLUSIONS

The combination of the techniques and the experience of the partners, as well as the collaboration with other European experts, has allowed to establish methodologies to the collection, characterization, treatment, conservation and cultivation of structural species of this habitat type.

Lots of all the species used in this work were added to the bank seed of the Botanical Garden of Valencia.

This type of framework promotes not only development but also the adoption and implementation of recovery plans, which are necessary to guarantee the preservation of the biodiversity.

ACKNOWLEDGEMENTS

Pablo Ferrer and Daniel Corral from CIEF, Carlos Peña and Aitza Sebastian from Piscifactoría el Palmar.

BIBLIOGRAPHY

- Arakawa, C.L., Luskner, E.W. & Baskin (1968). Effect of flooding on natural dormancy cycles in Jarrod seeds, of the wetland Carex species. Wetlands 14: 56-61.
- Arakawa, C.L. & Baskin, E.W. (1972). Germination of wild land wetland seeds with translocated seedbank: an experimental study. Wetlands 17: 82-87.
- Budelsky, H. & Galatowitsch, S.N. (2000). Effect of water regime and fertilization on the establishment of a native wetland in restored wetlands. Journal of Aquatic Ecology 33: 171-196.
- Ferrer, P. (2006). Recupero ecológico de un Lavajo temporal mediterráneo en Sinarcas (Valencia). Ph.D. thesis, Universitat de València. CIEF. Comarques del País Valencià, Alpic, Urbanisme y Jardins, Generalitat Valenciana, Valencia.
- Grootjans, A. & van Diggelend, G. (1995). Aerial seed dispersal and germination of submerged and emergent plants in a restored wetland. pp. 25-30. Wetland Ecology.
- Middelton, M. (1998). El medio natural y el paisaje en el sistema de agua de Valencia. 288 ppp. ICONA Ministerio de Medio Ambiente y Turismo. Madrid.
- Middelton, M. (1999). Restauración de humedales. Wetland Ecology and Management. pp. 119-121. Springer, New York.



Aquatics plants Centre, El Palmar, Valencia

Table 2. Structural species produced by different centres and methodologies.

SPECIES	Nº PLANTS	PROPAGATION	CENTRE
<i>Marsilea strigosa</i>	200	Natural asexual reproduction (rhizome)	Botanical Garden of Valencia
<i>Damasonium polyspermum</i>	50	Sexual reproduction (seed)	Aquatics plants Centre
<i>Eleocharis palustris</i>	200	Natural asexual reproduction (rhizome)	Aquatics plants Centre
<i>Lythrum borythericum</i>	200	Sexual reproduction (seed)	Aquatics plants Centre
<i>Lythrum thymifolia</i>	100	Sexual reproduction (seed)	Botanical Garden of Valencia
<i>Mentha cervina</i>	1500	Natural asexual reproduction (rhizome) and Sexual reproduction (seed)	CIEF
<i>Ammania baccifera</i>	200	Sexual reproduction (seed)	Aquatics plants Centre
<i>Isoetes velatum</i>	50	Sexual reproduction (seed)	Botanical Garden of Valencia
<i>Juncus simplexum</i>	40	Artificial asexual reproduction (slip)	Aquatics plants Centre
<i>Sedum caespitosum</i>	40	Artificial asexual reproduction (slip) and sexual (seed)	CIEF

*In phase of development.