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II Jornades de Botànica a Menorca

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2nd Botanical Conference in Menorca: Islands & Plants: preservation and understanding of flora on Mediterranean islands

Programme

Timetable	*Speaker*	*Issue/Title*
DAY 1: 26th of April 2011 (Tuesday)		
19,30-20,00	*Registration, welcome of those attending members and distribution of material*	
20,00-20,30	Opening event	
20,30-21,30	J.A. Rosselló	The forgotten islands: plant diversity on the Mediterranean islands (opening conference, in Catalan)
DAY 2: 27th of April 2011 (Wednesday)		
8,30-9,00	*Registration, welcome of the attending members and distribution of material*	
Session 1: Genaral aspects *(Chairman: Òscar Garcia Febrero)*		
09,00-09,45	Jacques Blondel (C.N.R.S, Montpellier)	Mediterranean landscape and human beings
09,45-10,30	Gerardo de Vicente (Complutense University of Madrid)	Geological history of the Mediterranean
10,30-11,15	Bertrand de Montmollin (UICN)	IUCN plant conservation programs in the Mediterranean
11,15-11,45	*Break – Poster session*	
11,45-12,30	Eva Moragues & Joan Mayol (Balearic Islands Government)	Management of endangered flora of Balearic Islands
12,30-13,15	Pere Fraga, Irene Estaún, Eva Cardona (Island's Council of Menorca)	The LIFE+ RENEIX project
13,15-15,30	*Lunch*	
15,30-20.00	*Outing to Binimel·là beach*	
DAY 3: 28th of April 2011 (Thursday)		
Session 2: Western Mediterranean *(Chairman: Cristòfol Mascaró Sintes)*		

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09,00-9,45	Javier López, Llorenç Sáez (Autonomous University of Barcelona) & Pere Fraga (Island's Council of Menorca)	The flora of the Balearic Islands
9,45-10,30	Laetitia Hugot (National Botanic Conservatoire of Corsica)	Flora of Corsica
10,30-11,15	Gianluigi Bacchetta, Giuseppe Fenu & Efisio Mattana (University of Cagliari)	The exclusive vascular flora of Sardinia: update and conservation actions
11,15-11,45	*Break – Poster session*	
11,45-12,30	Angelino Carta, Gianni Bedini (University of Pisa), Tomasso Guidi & Bruno Foggi (University of Firenze)	The flora of the Tuscan Archipelago: from genesis to conservation
12,30-13,15	Cristian Brullo, Salvatore Brullo & Gianpietro Giusso (University of Catania)	Phytogeographical considerations on the endemic flora of Sicily
13,15-14,00	Tommaso La Mantia & Salvatore Pasta (University of Palermo)	Circum-Sicilian satellite islands and islets
14,00-16,00	*Lunch*	
16,00-20,00	*Outing to El Pilar beach*	
DAY 4: 29th of April 2011 (Friday)		
Session 3: Eastern Mediterranean *(Chairman: Joan Rita Larrucea)*		
09,00-9,45	Costas Thanos (University of Athens) & Cristina Fournaraki (Mediterranean Agronomic Institute of Chania, Crete)	Conservation and management of the flora and vegetation of Crete
9,45-10,30	Costas Kadis (Fredericki University)	The flora of Cyprus: Diversity, Threats and Conservation
10,30-11,15	Pinelopi Delipetrou (University of Athens)	Aegean Island flora and endemism
11,15-11,45	*Break –Poster session*	

11,45-12,30	Toni Nikolic (University of Zagreb)	Flora of the Adriatic Islands (Dalmatian Islands)
12,30-13,15	Maria Panitsa & Iliadou Eleni (University of Ioannina, Agrinio)	Flora and phytogeography of the Ionian islands (Greece)
13,15-14,00	Edwin Lanfrancho (University of Malta)	Flora of Malta
14,00-16,00	Lunch	
16,00-20,00	*Outing to Algendar ravine*	
DAY 5: 30th of April 2011 (Saturday)		
Session 4: Islets *(Chairman: David Carreras Martí)*		
09,00-9,45	Errol Vela (University of Montpellier) & Daniel Pavón (Paul Cezanne University in Marseille)	Flora of the Habibas Islands (Algeria)
9,45-10,30	Henri Michaud (National Botanic Conservatoire of Porqueroles)	Flora of the Hyères Islands (France)
10,30-11,15	Carlos Fabregat (Botanical Garden of Valencia University) & Emili Laguna (Generalitat Valenciana)	From fire to nature: evolution, restoration and conservation of the Columbretes Islands flora
11,15-11,45	*Break – Poster session*	
11,45-12,30	Joan Rita & Gabriel Bibiloni (University of the Balearic Islands)	Flora of the Balearic islets
12,30-13,15	Frédéric Médail (Paul Cézanne University in Marseille)	The future in preservation of islands flora (closing conference)
13,15-14,00	Felipe Domínguez (Complutense University of Madrid)	The AFA Atlas project about threatened flora
14,00-15,30	*Lunch*	
15,30-20,00	*Outing to Cala Mitjana cove - Trebalúger*	
21	*Closing event (dinner)*	

ABSTRACTS

OPENING EVENT

THE FORGOTTEN ISLANDS: PLANT DIVERSITY ON THE MEDITERRANEAN ISLANDS

Josep A. Rosselló[1,2]

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Even though islands represent only ca. 5% of the earth's surface, they are considered one of the most important ecosystems of the world. Indeed, they host a significant proportion of global biodiversity, amounting to between 1/6 and 1/4 of vascular plants species so far known. Islands and archipelagos are outstanding biological systems because many of the species they harbor have narrow distributions and high endemicity levels. In fact, vascular plant endemic richness has been inferred to be ca. 9.5 times higher on islands than on mainland areas, and 20 of the 34 biodiversity hotspots defined by Myers *et al*. (2000) are islands or have a remarkable insular component. Furthermore, insular systems constitute a series of natural laboratories where hypotheses of general importance in evolution, biogeography, ecology and conservation can be developed, corroborated or falsified.

The different geological origins of islands have important evolutionary implications. Thus, continental islands derive either from the tectonic fragmentation of continental plates or by eustatic changes of sea level (transgressions) affecting continental lands. Therefore, they present a subset of the flora that already existed when the separation took place, whereas the component derived from long distance dispersal is not known. By contrast, oceanic islands derive from sudden volcanic processes and they become colonized by long-distance dispersal from continental lands, or other islands, through oceanic barriers.

Traditionally, continental islands have been considered refugia, fostering the accumulation of paleoendemic species. Conversely, oceanic islands are viewed as paradigmatic centers of active speciation, triggering the generation of neoendemics through adaptive radiation processes, as they offer a high abundance of niches available for colonization after their emergence.

Nevertheless, various important aspects on plant evolutionary biology on islands have not been addressed previously within a comparative and conceptually unifying framework that includes case studies from both oceanic and continental islands.

The Mediterranean basin is characterized by a high plant diversity and endemism, being recognized as a global biodiversity hotspot. This high biodiversity is due, in part, to the fact that Mediterranean areas served as refugia for many taxa during the Pleistocene glaciations, allowing the long-term persistence of populations, which have in turn favoured the formation of new species. The numerous islands present in the Mediterranean constituted major refugial areas (Médail & Diadema, 2009), and are nowadays a significant component of its plant diversity, with a large number of narrowly endemic taxa. In addition, the highly fragmented insular landscapes have promoted geographical and genetic isolation among plant populations, favouring allopatric speciation via selection and/or genetic drift. In spite of the central role that islands play to understand the evolution of plant biodiversity in the Mediterranean, and despite a long tradition of studies based on the richness of the Mediterranean flora in endemic species, it is only recently that the Mediterranean islands have regained interest from evolutionists, as shown by several studies on the evolution of the Aegean (Affre & Thompson, 1997; Widén *et al*., 2002; Bittkau & Comes, 2005; Edh *et al*., 2007), the

Balearic (Sales *et al*., 2001; López de Heredia *et al*., 2005; Molins *et al*., 2009; Rosselló *et al*., 2009) and the Corso-Sardinian floras (Falchi*et al*., 2009).
The islands from the Mediterranean basin belong to one of the richest speciose sites within the whole Mediterranean hotspot and include many endemic taxa showing a restricted distribution. For a long time it has been assumed that most of this biodiversity has been shaped by paleogeographic and ecological patterns, although the importance of other patterns and processes driving diversity within islands are not fully understood. Geographical variability in several Mediterranean insular species has been usually treated as noise when dealing with taxonomic treatments, lowering the real diversity present within islands. This has been mainly due to the fact that insular, peripheral populations belonging to widespread allopatric species are sometimes linked by a mosaic of morphologically intermediate, but geographically still discontinuous, non-interbreeding and long-isolated populations. This causes taxonomic troubles and disappointments when evaluating the endemic element within the autochthonous floras. However, increasing evidence shows that interspecific gene flow (without genome duplication through polyploidy) has been of great importance in driving cryptic speciation in several groups. Thus, primary speciation by geographic isolation followed by subsequent complex patterns of interspecific gene among narrowly endemic taxa and widespread species flow either in absence (e.g., hybridization and introgression) or presence of polyploidization has been involved in the diversification and speciation of several components of the insular flora from the Mediterranean basin.
This work has partly funded by the CGL2007-60550/BOS, CGL2010-22347-C02-01, and the 2009 SGR 608 projects.

Keywords: endemic richness, flora evolution, isolation, speciation

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SESSION 1: GENERAL ASPECTS

BIODIVERSITY AND HUMANS IN THE MEDITERRANEAN

Jacques Blondel

CEFE-CNRS

The Mediterranean realm has always been characterized by an extreme diversity in space and time of environments, natural communities and human societies. The succession of civilizations that waxed and waned in this region over several millennia has had great impacts on biota and ecosystems everywhere in the basin. This is so true that some kind of 'coevolution' has been claimed to shape the interactions between ecosystem components and humans. Although severe human-induced losses of biodiversity undoubtedly occurred in many groups of animals and plants since the Neolithic recent research from a combination of biogeographical, anthropological, genetical and ecological data provide a new insight on the common history of Mediterranean landscapes and human societies. I will show that: (1) One cannot understand the components and dynamics of current biodiversity in the Mediterranean without taking into account the history of human-induced changes; (2) The various systems of land use and resource management that provided a framework for the

blossoming of Mediterranean civilizations also had profound consequences on the distribution and dynamics of species, communities, and landscapes; (3) The processes of domestication of plant and animal species contributed to increase certain components of biodiversity at several spatial scales. Positive and negative feedback cycles between cultural practices and natural systems at the local and regional levels have kept ecosystems robust and resilient; (4) Assuming that human action can, to a certain extent, be considered a large-scale surrogate for natural sources of ecosystem disturbance, such patterns give support to the diversity-disturbance hypothesis — specifically, intermediate levels of disturbance have promoted biological diversity; (5) Intraspecific adaptive variation increased as a result of human-induced habitat changes, resulting in bursts of differentiation during the later Holocene of local ecotypes and gene pools of domesticated and wild plant and animal species.

Keywords: Biodiversity, coevolution, cultural landscapes, domestication, human impact, resilience

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TECTONIC EVOLUTION OF THE MEDITERRANEAN DURING THE CENOZOIC

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The Mediterranean palaeogeography during Cenozoic times is exposed through the description of the tectonic features of the Aegean domain (Hellenic arc-trench system and Anatolian peninsula escape and extension of the Aegean-West-Anatolian region), the Central Mediterranean domain (Calabrian arc, Apennines and the Sicily Channel) and the Iberian domain (The Iberian microcontinent and the Betic-Balearic orogen). Then a special mention is done about the reconstruction of the Western Mediterranean Subduction (WMSZ) and its relation to large displacements of the Balearic Islands, Corsica and Sardinia islands during the Tertiary. The type and characteristics of active stresses around the Mediterranean region, and its relationship with the seismicity of the zone are then described. Finally a special attention is done to the opening and closing of marine gateways (Gibraltar, Marmara) that have played an important role in the Neogene and Quaternary history of the Mediterranean.

Keywords: geology, marine gateways, Aegean, Central Mediterranean, Western Mediterranean, Iberian

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IUCN PLANT CONSERVATION PROGRAMS IN THE MEDITERRANEAN

Bertrand de Montmollin

Mediterranean Islands Plant Specialist Group, UICN

The Mediterranean Basin is one of the world's richest places in terms of animal and plant diversity. The Mediterranean is particularly noted for the diversity of its plants – about 25'000 species are native to the region, and more than half or these are endemic. This has led to the Mediterranean being recognized as one or the Global Biodiversity Hotspots.
The IUCN Centre for Mediterranean Cooperation and the IUCN Species Survival Commission have identified plant conservation and red listing as a regional priority for action. This will ensure the Mediterranean contribution to the implementation of target 2 of the Global StraThitegy for Plant Conservation. Target 2 aims to achieve *an assessment of the conservation status of all known plant species, as far as possible, to guide conservation action.*
IUCN has already assessed the conservation status of 200 endemic plant species and 500 freshwater plant species.
The ongoing work has he following objectives :

To assess the status of 1'500 restricted-range endemic, mainly concentrated on islands, peninsulas, rocky cliffs and mountain peaks. The principal foci being 10 regional mini-hotspots, characterized by areas of high plant richness and narrow endemism of more thant 10%.

To identify Important Plant Areas (IPAs) of the south and east Mediterranean region and to target these sites for conservation actions

To prepare a regional IUCN Red List for the Mediterranean (begin by focusing on restricted range species that are endemic to the region)

To assist Mediterranean countries in preparing National Red Lists and conservation priorities

To implement conservation measures in the field, together with local communities

To prepare a list of Mediterranean habitats and threatened habitats

Keywords : Biodiversity hotspots, conservation priority, conservation assessment, regional hotspots, Important Plant Areas, Red Lists

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MANAGING THREATENED PLANTS IN ISLANDS: TASK & PRIORITIES

Eva Moragues & Joan Mayol

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The geographical isolation of the Balearic Islands has encouraged the development of a singular and endemic flora unique to the islands. Part of this flora is seriously threatened in small populations, very fractioned and with few individuals. The administration has an obligation to protect, conserve and improve both their habitat and

the species themselves, and it requires two basic tools: legislation and management. For three years, the Balearic Government, under the legal support of Conservation and Recovery Plans, performs management actions to conserve species under highest category of threat. By the moment, our government has approved 5 recovery plans, 2 conservation plans and 1 management plan that include the protection of a total of 23 plant species. The main conservation actions realized are: demographic monitoring of the populations, (2) exploration to discover new locations, (3) remove pressure from herbivores and provide physical protection to threatened species, (4) control of competing plants species affecting the threatened flora, (5) reinforcement / translocation of endangered plants specimens in the wild, (6) actions such as collecting seeds for botanical gardens and seed banks and (7) awareness raising campaigns. The purpose of this paper is to present the first results from the adoption of the first plan in mid-2007.

Keywords: Management, conservation**,** endangered species, habitat restoration, reinforcement

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THE LIFE+ RENEIX PROJECT

Pere Fraga i Arguimbau, Irene Estáun Clarisó & Eva Cardona Pons

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The natural environment of Menorca, as other Mediterranean islands, has suffered in the last years and increasing human pressure due mainly to a strong growing of touristic industry. From this situation are derived some of the threats that pose a major risk for a long-term conservation of endangered or endemic plant species. Some of these alterations, like excess of frequentation in coastal habitats or proliferation of uncontrolled trails, can be managed using actions of low intensity as through social awareness or changing signalling. For other alterations or threats that heavy actions of an integral restoration of landscapes and habitats can be needed instead. As an example, failed attempts of urbanization in coastal areas.

The LIFE+ RENEIX project (LIFE07NAT/E/000756) faces a combination of these situations exposed before. That is, by one side looks to increase social awareness for the preservation of habitats or whole areas of the island of Menorca that hold a high concentration of biodiversity, mainly endemic or very rare plant species. But at the same time has as a main challenge an integral restoration of areas where failed urbanizations let a destroyed landscape due to the presence of a network of incipient streets and roads. Here actions of the project will be not just to increase or reinforce populations of plant of conservation interest, but also to look for a complete reconstruction of the landscape using construction techniques (i.e. heavy machines), traditional techniques (i.e. dry stone walls) and also natural processes (i.e. promoting natural succession of plant communities from pioneers to permanent ones).

The general desired result at the end of the project should be experiences and information that could be innovative and exportable to other regions with similar problems in coastal areas of conservation interest.

Keywords: habitat restoration, landscape, social awareness, biodiversity conservation, coastal habitats, Mediterranean

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SESSION 2: WESTERN MEDITERRANEAN

THE FLORA OF THE BALEARIC ISLANDS

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We reviewed the data on the diversity (number of native taxa) and the number of Balearic endemics published since the last check-list. Differences may be attributed to discordant taxonomic criteria, uncertain reports, misapplication of some names, misidentifications of herbarium material and unequal floristic knowledge of the different main islands of the archipelago. The native flora has 1.549 taxa, of which 138 are endemics. We comment some aspects on biogeography and biology of the endemic flora. The number of threatened taxa in the Balearic Islands is 180 (11,6 % of all native taxa). The greatest threats to the native flora are direct and indirect result from human activities followed by the goats' overgrazing. The list of protected species should be revised considering that 55,5% of the threatened species, and that almost half (46,1%) of the threatened endemic taxa, are not under legal protection.

Keywords: Balearic Islands, native flora, endemism, Mediterranean region

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THE EXCLUSIVE VASCULAR FLORA OF SARDINIA: UPDATE AND CONSERVATION ACTIONS

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Sardinia is the second-largest island in the Mediterranean Sea and its isolation and high geological diversity have created a wide range of habitats with high levels of endemism, especially on its mountain massifs, where there are conditions of ecological insularity. In this study the exclusive endemic flora of Sardinia has been updated and it consists of 167 *taxa*, 139 of which are species, 23 subspecies, 4 varieties and 1 hybrids, belonging to 37 families and 72 genera. Despite this rich biodiversity and the threats to these species, few biological conservation studies have been carried out. Therefore the "Regione Autonoma della Sardegna" funded in 2007 a conservation project for the most threatened exclusive endemic species of Sardinia. To categorize these species to be conserved, a priority list was created by applying 11 parameters based on rarity, threats and protection status. This work allowed the most threatened species of the Sardinian endemic flora to be identified.

Keywords: Endemics, IUCN, Mediterranean island, Population monitoring, Seed-banking, Threatened vascular flora.

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FLORA OF THE TUSCAN ARCHIPELAGO: FROM GENESIS TO CONSERVATION

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The Tuscan Archipelago, composed by seven islands and about twenty islets, is one of the most interesting areas in the Tyrrhenian Sea from the naturalistic and anthropological point of view. The archipelago is geologically related to the evolution of the northern Apennine and of the Cyrno-Sardinian block. Currently the flora of the whole Tuscan Archipelago consists of 1300 *taxa*, 80% of which are herbaceous, reflecting the Mediterranean setting of the area and the prevalence of secondary forms of vegetation; 1.2% of the *taxa* are endemic, most of which are related to Cyrno-Sardinian elements, suggesting that the Tuscan Archipelago represents a bridge between the floristic Cyrno-Sardinian dominion and the Italian peninsula. The human influence on the natural environment has been massive since Roman times (V century

b.C.), and more recently the change in land use and the development of tourism has increased the level of threat over the flora. Following the constitution of the National Park of the Tuscan Archipelago, several activities, like e.g. Life Natura Projects, were launched to contrast the loss of biodiversity due to (1) habitat damage, (2) invasion of alien plants and animals, and (3) change in ecological patterns. *In situ* conservation measures are backed by *ex situ* programmes in an integrated fashion, both as a safety tool and as a source of material for reintroduction projects. In this work we suggest further opportunities allowing to define new strategies of conservation.

Keywords: Tuscan Archipelago, endemic flora, National Park, *in situ* conservation, *ex situ* conservation, seed banks.

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CONSIDERATIONS ON THE ENDEMIC FLORA OF SICILY

Cristian Brullo, Salvatore Brullo & Gianpietro Giusso del Galdo

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A survey on the endemic flora exclusive of Sicily has been carried out. Based on the taxonomical, ecological, karyological, chorological, phytosociological, phenological and conservation data concerning each endemic taxa, the role played by each of them within the Sicilian territory has been examined. In particular, we provide detailed information on the numerical consistency of the Sicilian endemics in respect to the typology of endemism, family, phenology, life form, chorology, environment, ecology, phytosociology, and vulnerability.
A total of 322 taxa has been recognized as narrow Sicilian endemics, roughly corresponding to the 10% of the whole Sicilian flora. The noteworthy relevance of the Sicilian endemic flora is due to the occurrence of several paleo-endemics, usually with a punctiform distribution and chiefly localized on rocky habitats. Well represented are also the thermo-xerophilous and orophilous species, mostly linked to high conservative environments, as well as it is quite relevant the occurrence of several halophilous and nitrophilous endemics, testifying the old geographical isolation of Sicily form the neighbouring mainland territories.

Keywords: Sicily, endemism, flora, phytogeography.

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PLANT SPECIES RICHNESS, BIOGEOGRAPHIC AND CONSERVATION INTEREST OF THE VASCULAR FLORA OF THE SATELLITE ISLANDS OF SICILY

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We analysed the pattern of 1) species richness, 2) rate of endemism, 3) number of habitats of community interest according to 92/43 Directive and 4) number of exclusive, rare or threatened vascular plants living on 60 satellite islands and islets of Sicilian archipelago. We then investigated whether and to which extent these four parameters interact and if they depend upon five factors: 1) geographical setting; 2) geological history; 3) soil-type richness; 4) bioclimatic variability; 5) natural and human disturbance regime.
Moreover, we report the rarefaction and even the extinction of many interesting species. This process is mostly linked to human pressure; more in detail, it may be due to its increase, which caused the destruction, degradation and/or fragmentation of many plant communities (especially those linked to rocky or sandy shores and to temporary ponds), but also to its lowering; in fact, many noteworthy species are disappearing along with the abandonment of traditional land uses which created agro-ecosystems and open semi-natural habitats (vineyards, cereal crops, olive groves, extensive grazing, etc.).
Finally, we underline the need to have up-to-date information about species turnover, invasion processes and demographic patterns of the vascular flora of the islands and islets which host the most fragile communities and/or species populations.

Keywords: Habitats Directive, endemics, threats, traditional land uses, management

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SESSION 3: EASTERN MEDITERRANEAN

CONSERVATION AND MANAGEMENT OF THE FLORA AND VEGETATION OF CRETE

Costas A. Thanos[1] & Christini Fournaraki[2]

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Crete, the fifth largest island of the Mediterranean, is a well known hotspot of plant diversity as a result of both its longstanding isolation from the Greek and Anatolian mainlands and its great variety of habitats and climates. It hosts 1742 vascular plant species (ca. 2000 taxa) and shows a considerably high degree of single island endemism (159 species, 9.1%). On the other hand, the Greek flora is among the richest in Europe and the Mediterranean Basin and comprises (according to a recently compiled checklist) 6041 species (or 6912 taxa); Greek endemics amount to 1224-1442 taxa, with an overall endemism at the country level in the range 17.7-20.9% (or

15.1-17.6% at species level). The contribution of the Cretan flora to the Greek one amounts to 28.8% while, among the 13 floristic regions of Greece, Crete and Karpathos is second (next to Peloponnese) in absolute numbers of Greek endemics and first in local endemics.
Furthermore, out of the 26 plant taxa growing in Greece (all of them angiosperms) that have been included as priority species in the Annex II of the Directive 92/43/EEC, 8 plants are Cretan endemics, representing 5% of the total number of 158 embryophytes (among which 110 in the Mediterranean biogeographical region) of European priority on a continent level (while 17 taxa of Crete in total are among the 63 Greek plants included in the various annexes of the Habitats Directive).
In the two Red Data Books of the Greek flora (1995, 2009), Crete is represented by a significant number of threatened taxa (110 – of which 68 are Cretan endemics - out of a total of 476 or 23.1%); however, it is believed that this number will be at least doubled (on both island and country level) when the conservation status assessment will be completed for the entire flora.
Habitat diversity is also extremely rich in Crete, as illustrated by the long list of European habitat types (mapped by the Project LIFE94/NAT/GR/001201); 44 habitat types (among which 6 priority ones out of a total of 72 priority habitats for the entire European Union) are found within the boundaries of the 28 SCIs of Crete which along with the 26 SPAs comprise 30-35% of the total land surface of the island. Despite the legal proclamation of 54 protected areas for the Natura 2000 network in Crete, it is very unfortunate that a Management Authority has only been established in a single area, GR4340008 – Lefka Ori, the largest mountainous wilderness of Crete, which also includes the Samaria Biosphere Reserve (Samaria Gorge) currently managed efficiently by the Forest Directorate of Chania.
Several national and a few European projects have been implemented for the *in situ* plant and habitat conservation in Crete: LIFE95/NAT/GR/001143 (5 sites in western Crete), LIFE98/NAT/GR/005264 (Vai Palm Forest), LIFE99/NAT/GR/006497 (Rouvas Forest), LIFE04/NAT/GR/000105 (*3170 Mediterranean temporary ponds), LIFE04/NAT/GR/000104 (6 priority plants and *9370 Palm groves of *Phoenix*) and LIFE07NAT/GR/000296 (*2250 Dune juniper thickets [*Juniperus* spp.]). In addition, through several national and European projects (e.g. ENSCONET, GENMEDOC, SEMCLIMED), *ex situ* conservation of ca. 200 Cretan plants has been achieved by safeguarding seed collections in the Seed Banks of MAICh and NKUA (accompanied by the elaboration of detailed germination protocols).

Keywords: floristics, endemics, priority species, habitat diversity, LIFE projects

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THE FLORA OF CYPRUS: DIVERSITY, THREATS AND CONSERVATION

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Cyprus hosts a great variety of habitat types. This is due to the varied environmental conditions, which can meet the specific needs of a large number of plant species. So far, 1978 taxa have been identified , out of which 145 are endemic to Cyprus. The most

important floristic areas of Cyprus are Troodos mountain range and Pendadaktylos range, which host 94 and 60 endemic plants of Cyprus, respectively.
Many of the plant species of Cyprus are considered rare since they form small and few populations. The survival of many of these species is under immediate threat due to external anthropogenic pressures, such as urbanization, development (golf courses, tourism, etc.), military activities within natural areas, changes in agriculture, expansion of the mountainous road network, introduction of invasive species, climate change, etc. According to the "Red Data Book of the Flora of Cyprus", which evaluates the conservation status of the Cyprus flora based on the criteria set by the IUCN, 23 taxa are characterized as Regionally Extinct, 46 as Critically Endangered, 64 as Endangered, 128 as Vulnerable, 45 as Data Deficient and 15 as Near Threatened. Moreover, 18 taxa are included in Annex II of the EU Habitats Directive, and require the establishment of protected areas for their conservation, and 26 taxa are included in Appendix I of the Bern Convention and are characterized as Strictly Protected. Over the last 20 years, several initiatives have been developed focusing on the conservation of the flora of Cyprus. These include the ratification of relevant legislation (e.g. the adoption of the EU Habitats Directive), the preparation and implementation of management plans for the Natura 2000 sites of Cyprus and the implementation of a series of projects focusing on the *in situ* and *ex situ* conservation of endemic, rare and threatened plants of Cyprus.

Key Words: Cyprus flora, endemic species, plant conservation

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AEGEAN ISLAND FLORA AND ENDEMISM

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The Aegean Sea is a continental archipelago with c. 1300 islands and islets ranging from 100 m^2 to 8.260 km^2. Regarding phytogeography, it includes 5 main insular floristic regions (North, West and East Aegean, and the Cardaegean area of the Kyklades and Kriti) and several islands, which belong to 2 mainland floristic regions (Peloponnisos and Sterea Ellada). Isolation time varies among the islands, from 9 – 10 mya to 1.8 mya, but some islands were isolated as late as 10,000 years ago while others are ocean (never connected to land). The extant flora and endemism are the result these complex paleogeographical events, of the rugged geomorphology and geographic position among 3 continents and also of the age long human presence on the islands. The Aegean is one of the best studied areas in Greece and the surveys by plant collectors and botanists since the 18th century were compiled in the Flora Aegaea by K.H. Rechinger published in 1943. Despite this, there are still gaps in the floristic knowledge of the islands: there are complete floras for 41 out of 145 larger islands

(≥100 Km^2) and for 185 out of more than 1000 islets. The insular floristic regions host 1600 – 2400 plants species each and endemism ranges from 1 % (N Aegean) to 8 % (Cretan Area). In total, the Aegean hosts c. 600 species (800 taxa) which are endemic to Greece, of which c. 380 species (580 taxa) are endemic to the Aegean only. At floristic region scale, area explains adequately total species numbers but not endemic species numbers and species area curves indicate higher endemism in insular than in mainland regions in Greece. At island scale, both total and endemic species richness are significantly correlated to island area but are driven by different biogeographical factors. There are adequate data for the conservation status of c. 800 of the Aegean plants (620 of them Greek endemic). According to these, in the Aegean there are 242 threatened and 340 rare or near threatened plants. For most of them threat is mainly related to the very restricted distribution. Tourism development and grazing and management for grazing are identified as the main causes of the decline of plant populations. Legal protection is quite adequate, including international conventions and national law. Moreover, the National List of Natura 2000 sites of Greece includes a total of 73 SCIs in the Aegean (25 of them on the largest islands of Evvoia and Kriti). However, the examples of actual *in situ* management for conservation and of application of the legal provisions are few.

Keywords: Natura 2000, endemism, threats, conservation status, floristics

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FLORA OF THE ADRIATIC ISLANDS

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The eastern Adriatic coast, besides the Greek coast, is one of the most diverse in the Mediterranean area. There are 1151 islands, islets and reefs, and 80 additional reefs periodically appear above the sea level, depending on tides. During the Pleistocene the Adriatic basin was strongly influenced by the Ice Ages. The recession and elevation of the sea level significantly influenced the coast lines, causing various levels of islands isolation and different encirclement for endemism development. For approximately 250 islands the flora is well known, but for the rest, the data are mostly incomplete or the flora is barely known. SAR extrapolation (Species-Area Relationships) shows that for the whole area of all Croatian islands (approximately 3300 km^2) up to 2600 species were expected. Same models shows for whole Mediterranean area along the east Adriatic coast (approximately 17.250 km^2) the number of species come up to more than 4000 taxa. From this total number of endemic taxa inside Croatian Mediterranean area are distributed 244 endemic taxa (66%), and the proportion of these endemics per island varies from 0% up to 28.6%. To define the area of particular botanical values, the Important Plant Area (IPA) concept is used. Using IPA criteria the total of 94 IPAs were identified in Croatia with total area of 9543 km^2, i.e., 17% of the whole state territory. The land area cover only 0.022 km^2 (island Jabuka), and the largest even 2013 km^2 (Velebit mountain), while 75% of IPAs have area up to 100 km^2. The 66% of IPAs in Croatia is placed in the Mediterranean area defined in wider sense (i.e. including mountains chains in very close vicinity). In the majority of IPAs (60%) the biodiversity threats and negative trends are observed. Straight appliance of the

National Ecological Network and Natura 2000 network in preparation, together with regular application of related legislation could protrude possibility of preservation.

Keywords: diversity, flora, Adriatic islands, endemism, important plant area

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FLORA AND PHYTOGEOGRAPHY OF THE IONIAN ISLANDS (GREECE)

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The Ionian Islands are located in the Ionian Sea in western Greece. The major Ionian Islands are Corfu (Kerkira), Lefkas, Ithaci, Kefalonia and Zakinthos but there are also many smaller islands and islets. The area covered by the islands varies from 59200 ha (for the island of Corfu) to 1.5 ha while the maximum elevation from 1628 m (for the island of Kefalonia) to 12 m. At the phytogeographic region of the Ionian area, there is a National Park (Mount Aenos, Kefalonia), a National Sea Park (Zakinthos) and, all or in two cases part of, twenty-one SCI and/or SPA Natura 2000 Sites covered by more than 20 different habitat types of the Annex I. Concerning Ionian islands floristic composition, a database has been created using all available literature and the authors unpublished data, with a total number of about 2500 plant species and subspecies of which 3.2% are Greek endemics and 0.9% is area or single island endemics. This low rate of endemism is possibly because of the palaeogeography of the Ionian area which has been quite simple, with most islands becoming isolated from the mainland during the Pleistocene or even more recently. The relationship between biogeographical factors and plant diversity is examined and discussed as well as b-diversity between islands and islets. We also focus on the presence of invasive species in the floristic composition of the islands and the conservation status, measures and strategies for the protected areas and the critical species.

Keywords: Biodiversity, island flora, endangered species, single island endemics, island biogeography, conservation

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THE FLORA OF THE MALTESE ISLANDS

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The present flora of the Maltese Islands is the product of long-range dispersal, short-range dispersal over land-bridges during glacial periods followed by isolation during inter-glacial periods and, over the past 7000 years, deliberate and accidental introductions by humans. The Maltese Islands are situated at a geographical crossroads and the flora of the islands consequently includes representatives of the floras of all the regions of the Mediterranean including species with eastern, western and North African affinities. The Maltese flora is most similar to that of the Hyblean Region of Sicily, a zone that the Maltese Islands have been connected with through land bridges during the last glaciation.

The known vascular flora of the Maltese Islands presently comprises approximately 1100 species of which approximately 850 are indigenous or archaeophytic. An additional 700 species are casual aliens or very commonly/prominently cultivated and may spill over into natural communities.

The main determinant of the Maltese flora is the markedly biseasonal climate, with a cool wet winter and a hot, dry summer. The biological drought that characterises the dry season is the principal abiotic constraint on the pool of potential colonisers and accounts for the high proportion of xerophytes, halophytes, geophytes and annuals in the flora of the islands.

The principal vegetational communities of the Maltese Islands are generally considered as seral stages of a Sclerophyll series characterised by steppe, shrub formations, maquis and scattered woodland. Complex communities dominated by ruderal species and characterised by considerable seasonal and inter-annual change are also widespread. Other plant communities are restricted to specific habitats including temporary pools, watercourses, saltmarshes and cliffs.

Seventeen species are known to be endemic to the Maltese Islands whilst a similar number are sub-endemic and restricted to the Maltese Islands and circum-Italian islands. This figure, representing approximately 1% of known species is relatively low compared to other Mediterranean islands and may be attributable to early and intense habitat degradation through anthropogenic influence.

Much of the published work on Maltese flora over the past century has been concerned with taxonomy and the description or redescription of new species, subspecies and varieties. More recent work is focusing on the ecological interactions of species in their communities as this is of obvious importance for conservation and restoration programmes.

Keywords: floristics, biogeography, management, vegetation, habitats,

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SESSION 4: ISLETS

FLORA OF HABIBAS ISLANDS (N-W ALGERIA)

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Within Alboran Sea, along NW-Algerian coasts, Habibas archipelago belongs to the Betico-Rifean hotspot and was probably good refugia during glacial ages and subsequently during Holocene. Since Maire, Wilczek and Faure in 1934, floristic investigations were very poor. About 100 vascular plant taxa are known on the main island, which 3 species (*Brassica spinescens, Spergularia pycnorrhiza, Anthemis chrysantha*) are endemic from Algerian or Spanish-Algerian coasts, and 2 varieties (*Sonchus tenerrimus* var. *amicus*, *Asteriscus maritimus* var. *sericeus*) are strictly endemic from archipelago. Since 2006, several expeditions organized by "PIM Initiative" (initiative for the Small Islands of the Mediterranean) allow us to confirm presence of the main taxa and particularly the endemic ones. About 80% of the initial flora is still observed 72 year after, and the new taxa are essentially belonging to spontaneous Mediterranean flora. Nevertheless, several potentially invasive xenophytes are listed on the islands and need to make a survey in the future. The recent classification as Protected Marine Area should permit to conserve naturals habitats and their endemic and spontaneous flora in a good conservation status. A succinct biogeographical analysis is made in comparison with other Algerian and Tunisian archipelagos.

Keywords: Vascular flora, endemics, invasive species, legal protection, biogeographical analysis

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HIGHLIGHT ON FLORA OF THE HYÈRES ISLANDS : ORIGINALITY AND THREATS

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The Hyères Islands, located in South-east France, are 3 small islands, the largest reaching 1254 ha. Since the Middle Age, medicinal herbs from the archipelago were in largely used. From the XIX century up to now, the knowledge of the flora steadily increased. Today, 1068 taxa are known from the whole Archipelago. The most

remarkable species are Tyrrhenian element, insular plants and species in northern limit of their range, all of them absent or exceptional in the nearby mainland. This flora is mainly threatened by excessive frequentation, natural maturation of the ecosystems and invasive plants.

Keywords: Tyrrhenian flora, insular plants, excessive frequentation, invasive plants

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FROM FIRE TO NATURE: EVOLUTION, RESTORATION AND CONSERVATION OF THE COLUMBRETES ISLANDS FLORA

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This paper deals with plant richness and singularity of the Columbretes Islands (Valencian Community, E Spain), a small volcanic archipelago 56 km far from the E Spanish coast. These islands house the whole wild population of the exclusive endemic plant *Lobularia maritima* subsp. *columbretensis*, as well as the iberian-balearic endemic moon trefoil *Medicago citrina*. They also hold the unique Spanish populations of *Reseda hookeri* and *Fumaria munbyi*, and the main one of *Lavatera mauritanica*. Since 1987, the Biodiversity Service of the Generalitat Valenciana develops the main actions to restore the ancient vegetation, saving from extinction several climacic and preclimacic taxa (*Withania frutescens*, *Lycium intricatum*, etc.). The successful re-introduction of *M. citrina* in the main island –Illa Grossa– was achieved, and several conservation actions for the main threatened taxa are carried out.

Keywords: Columbretes Islands, Mediterranean flora, Endemics, Plant Micro-reserve, Plant conservation, Re-Introduction

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THE FLORA OF THE ISLETS OF THE BALEARIC ISLANDS

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A description of the flora and vegetation of the islets of the Balearic Islands is presented. We have found 654 species in 91 islets of the Balearic Islands. 30% of these species were found on only one island, and only 82 species have been found in more than 20% of the islets, which shows the great variability of the flora from an islet to another. We also present a summary of the major plant communities, which include the nitro-halophytic shrub communities, as well as those that colonize the cliffs that are very rich in endemic species.
The islands of less than 5 ha are poorly fitting the general model that relates the number of species and island area. The number of habitats is shown as a better descriptor of the number of species than the surface for these small islands. Significant differences were observed between the rates of life forms, especially chamaephytes and therophytes, between the islands of less than 5 ha and more than 5 ha. Finally, we mention some of the main environmental disturbances affecting the islets, with special reference to the introduction of goats and rabbits, and the presence of seagull colonies.

Keywords: Insularity, Endemism, Surface-Area Relationship, Life form, Cabrera, Biogeography

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CLOSING SESSION

THE FUTURE OF MEDITERRANEAN ISLAND'S FLORA CONSERVATION

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The biotic originality of Mediterranean islands can be explained by complex interactions between a highly heterogeneous historical biogeography and unique ecological processes linked to various insular conditions. But most of the ups and downs of this biodiversity are now closely linked with human population pressures, which have changed many times through the long history of ecological systems and island location. If climatic changes represent a threat, there are several uncertainties related to species' range shifts and the rate of habitat modification. But these impacts will be probably exacerbated on islands because of no (or highly limited) adjacent areas of expansion. Therefore, conservation and ecological monitoring of islands and islets must be reinforced, since they constitute major refugia areas with the presence of endemic relictual plants, often threatened on the continent.
Here, I present some key issues for future researches. First, the need for a better understanding of evolutionary and biogeographical processes, and also the necessity

of analysis and modelling the spatial congruence between the three major levels of biodiversity. Assessing functional diversity, notably the key biological interactions, appears to be a proactive research to mitigate mutualistic disruptions or species extinction.
The future of conservation planning of Mediterranean islands should be included within a conservation biogeography schedule in order to furnish the prerequisite tools for the identification of crucial conservation areas in today's context of global change. A better knowledge of past environments and ancient human impact appears also necessary to infer ecosystem dynamics and suitable trajectories for ecological restoration. There is also an urgent need to develop cooperative networks between stakeholders, notably between the European conservationists and those from the southern and eastern part of the Mediterranean. But since the most important changes in flora, vegetation and insular landscapes will be induced by human practices, the only sustainable solution depends on a systemic and interdisciplinary approach of biodiversity conservation considering the diverse socio-economic trajectories of each island.

Keywords: conservation biogeography, insular biogeography, islets, Mediterranean islands, mutualistic interactions.

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PLANT CONSERVATION INVENTORIES, WHAT WE GOT NOW AND WHAT WE NEED FOR THE FUTURE

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Since the last 20 years plant conservation inventories in Spain has produced a paramount increase not only on basic knowledge related to endangered plants, but also in Conservation tools and protection strategies. One of the key projects in this recent development is the *Atlas de Flora Amenazada* project (known by its Spanish acronym: el proyecto AFA). Since its inception in 2000 this collaborative work among Spanish botanists have produced some important conservation products: two Red Data List (one in 2000 and one recently publish in 2008), an ongoing effort in Red Data Books (with four volumes already published), a very novel large scale demographic approach for some of the most endangered plants in Spain and finally a well-accepted methodology for plant conservation inventories.
As a result of AFA and several equally important regional initiatives the amount and quality of data in relation to plant conservation is extraordinary. From our point of view, we all, scientist and managers, need to step down, and analyse inventories and present trends gathered in these past years. Doing this we will be able to use lessons learned in this process to produce better inventories in the future. Better inventories means informative, in other words gathering biological data useful to improve direct

conservation to threatened populations. It also means doing inventories with less resources and less time but equally accurate to detect future biodiversity trends.

Keywords: AFA project, Spain, endangered plants, Red Data List, demographic approach

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POSTERS

BALEARIC AND TYRRHENIAN FLORA AT THE BOTANICAL GARDEN OF BARCELONA

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Introduction and objectives
The Botanical Garden of Barcelona maintains Mediterranean plant collections from around the world. Its main objectives prominently include the conservation and documentation of Catalonia's natural heritage and other surrounding territories. We conserve the plant collections on the garden and/or on the seed bank and we try to study their growing pattern.
The plants are grouped according to the five Mediterranean regions of the world, and within these areas, the plants are grouped by ecological affinity, i.e., they represent the natural landscapes.
One of these areas is the Mediterranean Basin, the lands that surround the Mediterranean Sea. And one of the landscapes that we try to represent is called Balearic Island and Tyrrhenian flora rock crevice community. Balearic and Tyrrhenian rock crevice community floraCalcareous rock formation contains a representation of the most frequently found plants and endemic species from the coast, scrub, oak forests and high mountains of the Balearic Islands. The predominant species in coastal areas are *Astragalus balearicus* and *Launaea cervicornis*, while holm oak predominates in the scrub and low woody species from the Lamiaceae and Leguminosae families, as well as many geophytes. In our landscape we have lots of Balearic and Tyrrhenian endemisms like: *Dracunculus muscivorus, Erodium reichardii, Paeonia cambessedesii, Digitalis minor, Femeniasia balearica and Lysimachia minoricensis*, among others. Germination testsIn the seed bank of the Botanical Garden we tested if there are germination differences between different species of hypericum from the Iberian Peninsula and the endemic hypericum of Balearic Islands.

Keywords: Balearic-Tyrrhenian flora, botanical garden, endemism, germination, hypericum

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ENVIRONMENTAL RESTORATION ACTIVITIES IN THE SCIs OF BINIMEL·LÀ AND ELS ALOCS WITHIN THE LIFE + RENEIX PROJECT

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The main objective of LIFE+RENEIX project is the restoration of four degraded areas that hold some communities of interest and priority species of the flora of Minorca included in the Habitats Directive. All of them are located within the Natura 2000 Network in the island. Two of those areas, “Els Alocs” and “Binimel.là”, in the north coast, are threatened by severe degradation processes. Both areas underwent a profound change when projects for development these areas were initiated in the 70s. Fortunately, these projects failed, and the construction of more than 4.000 apartments was interrupted. Four decades later the degradation persists in both areas, now caused also by motorised traffic outside stablished roads, motocross, and the pressure of tourism.
This is the framework of LIFE+RENEIX project, which includes the restoration of both areas. Thus some of the scheduled activities are the restitution of original geomorphology, the recovering of ancient dry stone structures for delimiting paths, using the traditional techniques, and the recovery of original vegetal communities.
Beyond the island of Minorca, the results and experiences of this project will have an added value for other Mediterranean regions. Combining landscape and habitat restoration, endangered plant species management and a wide social implication in the actions, give to this project an innovative scope.

Keywords: LIFE Nature, Minorca, habitat restoration, priority species,

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THE LIFE+ RENEIX PROJECT AND SOCIAL AWARENESS OF THE CONSERVATION OF BIODIVERSITY IN MENORCA

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One of the main objectives of LIFE Nature projects is to promote social awareness of major issues and conservation objectives on which they operate.
The LIFE+ RENEIX project aims to provide the basis for ecological restoration of natural sites on the island that have been degraded because of several attempts of urbanization, road opening, excessive human frequentation and proliferation of

motorized access. Therefore the goal of public awareness is focused on two major aspects: first, to prevent misuse of the natural environment (i.e. motorized traffic outside the established roads, motocross, excessive pedestrian traffic, etc..), and on the other hand, to promote a public awareness of the value of the biodiversity and ecosystem services it provides, and the need to restore, maintain and protect unique natural areas of the island which have suffered significant pressure since the 70's.
Some of the scheduled activities are the dissemination of project objectives and results through a website and publishing educational materials, creating educational botanical routes, developing specific awareness campaigns for motorists, and active citizen involvement in habitat restoration through participation in volunteer days.

Keywords: LIFE Nature, Menorca, habitat restoration, social awareness, participation

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THE RECOVERY OF THE PAS D'EN REVULL UNDER THE LIFE+ RENEIX PROJECT

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One of the areas covered by the LIFE+ RENEIX project is the Pas d'en Revull, which is a stretch of the Camí Reial, an ancient route that connected the two main villages of the island until the eighteenth century, that runs through the Algendar gorge. This is one of the most famous scenic spots of the island, originated by a strong karst activity. It holds a high diversity of habitats and species in a confined space, which in part have a human influence since ancient times.
Restoration of the Pas d'en Revull has been carried out with the aim of recovering the ancient dry stone wall structures that delimit and protect this area, using the traditional techniques of dry stone wall building, and signaling the route in order to raise awareness of the ecological and botanical values of the area, fulfilling the important role of social awareness that can be developed in this area. Different social groups and volunteers from the municipality of Ferreries, who are concerned about the conservation of this unique pathway, have participated actively in the works of clearing and restoration.

Keywords: LIFE Nature, Menorca, habitat restoration, dry stone wall, social awareness, participation

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LEAF SHAPE VARIATION IN TWO SYMPATRIC RUPICOLOUS SPECIES OF *HELICHRYSUM* (ASTERACEAE) FROM THE BALEARIC ISLANDS, ASSESSED BY GEOMETRIC MORPHOMETRY

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Selection of useful morphological traits to discern among closely related species is not always succeeded, especially when qualitative characters are scarce, like in the western Mediterranean *Helichrysum* sect. *Stoechadina*. The Balearic endemic *H. crassifolium* (L.) D. Don is a very variable species in terms of leaf size and shape, and it is frequently discriminated from the remaining taxa of this section based on ambiguous qualitative traits and on leaf width measurements. Thus, the aims of this study are (i) to characterize leaf morphological variation between the two rupicolous species of *Helichrysum* in the Balearic Islands: the endemic *H. crassifolium* and the sympatric and widespread Mediterranean *H. pendulum* (C. Presl) C. Presl, to ascertain to what extent leaf shape is a good taxonomic feature to discriminate between these rupicolous species; and (ii) to outline the causes underlying in the observed leaf variation.
A geometric morphometric approach was used to characterize leaf size and shape of both species, using Relative Warp Analysis. Both species were sampled in all its distribution area in the Gymnesic islands, and linear and geometric morphometric measurements were correlated between species. Also, morphology was correlated towards several climatic variables from each sampled locality using two-block partial least squares analysis.
Results show that there is a continuous range of leaf variation between *H. crassifolium* and *H. pendulum*, besides both species can be discriminated based on leaf traits. Variation between populations of either, or both, species do not respond to abiotic factors. Rather, recurrent natural hybridization events seem to better explain such situation. Also, data suggest that other *Helichrysum* species are involved in such hybridization events. Therefore, conservation of the endemic *H. crassifolium* cannot be unlinked from the conservation of the whole genus species of the archipelago.

Keywords: Balearic Islands, geometric morphometrics, *Helichrysum crassifolium*, *Helichrysum pendulum*, leaf variation, natural hybridization.

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THE CONTRIBUTION OF THE E+M / PESI PROJECTS TO THE VASCULAR FLORA OF THE MEDITERRANEAN ISLANDS

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The Euro+Med PlantBase (http://www.emplantbase.org) has provided an updated and critically evaluated on-line database and information system for the vascular plants of Europe and the Mediterranean region. The first stage of this project has been financed for three years (2000-2003) by the European Union under the Framework V. The first result was a rough taxa list with detailed distribution including the major strictly Mediterranean islands, the Canary islands, the Azores and Madeira, but never completely checked above all for extra European territories. This list has been critically reviewed in part, by editors and designated experts for countries or groups. One of the first tangible results of this project was the publication of Med-Checklist vol. 2, which includes the treatment of the *Compositae* for all Mediterranean countries. Under the Euro+Med PlantBase project, 62 families have been checked. The revision of the remaining families is currently done under the boost of PESI.
PESI (http://www.eu-nomen.eu) is a three-year project, started in May 2008, funded by the European Union under the Framework VII. Led by the University of Amsterdam, PESI comprises 40 partner organizations from 26 countries in the fields of botany, zoology, mycology and phycology. PESI is intended to facilitate access to taxonomic information using standardized records of names and synonyms for the benefit of experts responsible for the management of biodiversity in Europe.
PESI coordinates the integration of various taxonomic and nomenclatural systems in use in Europe. The establishment of a common interface to allow users to get the information they need.
A key element of this initiative is the critical evaluation of the database. A mechanism for interregional cooperation enables the gradual revision of the taxonomy of families, genera, species and subspecies described in the Euro-Mediterranean region.
Actually 140 families are online covering about the 85% of the whole flora.

Keywords: Checklist, databasing, nomenclature.

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ENDANGERED TAXA OF THE SICILIAN FLORA AND CONSERVATION PERSPECTIVES

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Sicily is one of the phytodiversity hotspots in the Mediterranean area. Its flora includes 322 strictly endemics and 180 taxa shared with some close territories (the 9.91% and 5.54% of the whole flora respectively). This without considering several taxa for which

Sicily represents their southern or western distribution boundary. Several of them occur in few or a single population often limited to a restricted area.
Some species have already been subject of specific studies (*Abies nebrodensis*, *Betula aetnensis*, *Brassica* sp. pl., *Calendula maritima*, *Cytisus aeolicus*, *Petagnaea gussonei*, *Silene hicesiae*, *Zelkova sicula*). Others, recently discovered or taxonomically re-evaluated, are still deficient of an accurate monitoring. Examples are: *Acinos minae*, *Adenostyles alpina* subsp. *nebrodensis*, *Anthyllis hermanniae* subsp. *sicula*, *Centaurea erycina*, *C. saccensis*, *Erica sicula* subsp. *sicula*, *Hieracium* sp. pl., *Isoetes todaroana*, *Ptilostemon greuteri*, *Rhamnus lojaconoi*; the large part of them is data deficient regarding population size and trends necessary to define the IUCN categories.
The occurrence of protected areas (Natural parks and reserves) plays an important role in *in situ* conservation of these taxa. But this action is often only indirect since local managers are unaware of the rarities to be protected. So these taxa need specific conservation projects starting from a careful population study. Taking in account the low number of individuals, in several cases *ex situ* conservation interventions are needed including micropropagation techniques starting from cell cultures. Particular attention has to be addressed to popular sciences to inform public opinion about plant diversity richness in their area and on its fragility. The Department of Environmental Science and Biodiversity (formerly Botanical Sciences) of the University of Palermo, since several years, works in this direction organizing round tables and meetings also in peripheral structures (the Laboratory Sistema Madonie and the Nebrodi Seedbank).

Keywords: Sicily, Micropropagation, Popular science.

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GERMINATION BEHAVIOUR OF 5 THREATENED ENDEMIC PLANT SPECIES FROM WESTERN MEDITERRANEAN ISLANDS AND COASTAL CLIFFS

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The CIEF's Germplasm Bank of Valencian Wild Flora evaluates the germination rates (G) of five steno-Mediterranean (SM) or Iberian-Balearec (IB) endemic plant species living living on islands, and strictely protected (PR) by the Valencian Community (Spain) laws: *Diplotaxis ibicensis* (IB, PR), *Lavatera mauritanica* (SM, unprotected), *Medicago citrina* (IB, PR), *Reseda hookeri* (SM, PR) and *Silene hifacensis* (IB, PR). Seeds were collected in Columbretes Islands, and along the complex of plant microreserves placed at small islands and coastal falls of Northeastern Alicante. Germination protocoles have followed the current ISTA rules. Seeds were sown under sterile environment provided by a laminar flux chamber, using Petri dishes (9 cm in diameter), and two Albet filter paper, damped with destillate water up to saturation level. Each lot held 4 replication plates holding 25 seeds per dish. The germination tests where made using a incubator chamber programmed to hold several culture conditions: 10/20ºC, 20ºC, 15ºC y 10ºC, with equilibrated photoperiod (12/12h light/shade). Only *Reseda hookeri* shows low germination values, maximum G=3% at 15 and 10ºC (T_{50}=39±22,63 and 41.6±0.70 days for n=7 different tests). *Diplotaxis*

ibicensis reached G=96±3,23% at 10/20ºC , T_{50}= 8,23±0,38 (n=3). Both for *M. citrina* and *L. mauritanica*, the maximum values are obtained at 20ºC: G=90±8,3% (T_{50}=3,1±0,95; n= 3) in *Medicago* and G=83±13,22% (T_{50}=4,67±0,53; n=3) in *Lavatera*. In the case of *S. hifacensis* (n=32), germination rate was from G=58±12,4 to 100%, except for 2 accessions only yielding G=5% -apparently caused by unmature seeds. On the germination speed the extreme values obtained ranged between T_{50}=2,58±0,53 (at 20ºC; G=98±2,3%) and 16,25±1,7 (at 10/20ºC; G=79±8,8%); the medium value for the whole treatments was 5,74±0,54 days (n=32). Except for the Critically Endangered *Reseda hookeri*, the results show that the insular threatened species use to have a good and quick germination response under controlled conditions.

Key words: Germination, Endemic species, Endangered Species, Mediterranean islands, Valencian Community.

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EXPERIENCIES AND RESULTS OF THE CONSERVATION OF PLANT SPECIES THROUGH LIFE NATURE PROJECTS IN MENORCA

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LIFE Nature projects are focussed on the conservation of habitats and species within the Nature 2000 network. They should be understood not only as proposals developed with a limited time scope, but also as a starting point of conservation and management that should be continued over a longer period, beyond the project itself. Required follow-ups, such as the Post-LIFE action plan, are clearly related to the longer-term duration of the project's objectives. In the particular case of Menorca, a retrospective examination of the results achieved by three consecutive LIFE Nature projects, more or less related to plant conservation, can be seen as an example of the maintenance of their objectives and aims after the formal end of each one.

LIFE2000NAT/E/7355 (http://lifeflora.cime.es) was devoted to a long-term management of the plant species of Menorca included in the Habitats Directive. Different actions were carried out including the elaboration of individual management plans and investigation into the threats and conservation needs of these species. Noteworthy intervention within this project was the eradication of the invasive alien species *Carpobrotus*, which has become a demonstrative case study of alien plant control within a whole territory.

LIFE05/NAT/ES/000058 (www.cime.es/lifebasses) had as main objective the conservation and management of Mediterranean temporary ponds, a priority habitat that stands out for the high diversity of plants it supports, most of them restricted to this type of habitat and rare within their distribution range. Some outstanding features of this project were the use of traditional techniques to restore and preserve the habitat and the co-operation of landowners and stakeholders. Some actions of the project are still ongoing and positive results have clearly been achieved with preservation of local populations and habitats.

LIFE07NAT/E/000756 (http://lifereneix.cime.es) is currently being developed and is focussed on the restoration of complex areas that hold a high diversity of habitats and species. Some results, mainly on social participation, are already visible.

Keywords: LIFE Nature, invasive species, habitats conservation, biodiversity, long-term management

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CARTOGRAPHY OF RIPARIAN VEGETATION AND ASSESSMENT OF ITS ECOLOGICAL STATUS IN MENORCA (WESTERN MEDITERRANEAN, SPAIN).

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The riparian vegetation has an important function in the maintenance of the good ecological status of the rivers and streams: stabilisation of river banks, maintenance of water quality and water flows, habitat for aquatic species, and maintenance of biological diversity are some of the principal functions.
The mapped area correspond a buffer of 100 meters along 19 major streams in Menorca using a phytosociological classification. The cartography of the vegetation communities shows that the streams and the associated vegetation have been modified and altered. The largest area covered in the riparian zone contained in a buffer of 30 meters is agricultural land. The riversides are occupied by agriculture and pastures in the 45% of the total buffer surface, 29% are forest climax communities: *Prasio-oleetum* (wild olive maquis), *Cyclamini-Quercetum ilicis* (holm oak forest) or mixed forest, and the 8% is *Rubo-Crataegetum brevispinae* (bramble patch). The buffers of 10 meters are still mainly occupied (28%) by agriculture and pastures, another 28% are forest climax communities and *Rubo-Crataegetum brevispinae* increases its percentage, in this case 17%. The riparian climax communities are less abundant but with very high value. *Tamaricetum* represents the 3,4% of the buffers of 10 meters. Priority habitats of European interest *Scirpetum maritimo-litoralis* and *Thypho-Schoenoplecteteum tabernaemontani* represent the 3,2% and the 1,8% respectively. In the 2,3% of the surface of those buffers we find *Arundo donax*, a community with strong invasive power. Is remarkable the presence of European interest and protected, threatened and high interest species like *Vitex agnus-castus, Alisma plantago-aquatica, Eleocharis palustris, Iris pseudacorus and Aristolochia rotunda* among others.
Thus most of the stream banks are extremely humanized. In many cases, farming to the edge of the riverbed and the mechanical clearing have removed almost completely the vegetation. The canalization and excavation of the riverbeds, jointly with the ephemeral status of the streams, make difficult the settle of vegetation with higher water demands. The abundance of bramble highlights that the riparian vegetation is

deteriorated, and the vegetal cover is dominated by secondary communities with an important presence of invasive species, particularly alarming is the presence of *Arundo donax*.

Keywords:, riparian vegetation, priority habitats of European interest , invasive species.

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THE HERBARIUM GENERALE MINORICAE

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After the historic Rodríguez Femenías Herbarium, now preserved in the Institut Menorquí d'Estudis, the Herbarium Generale Minoricae (from now on: HGM) is the second important botanical collection of vascular plants that is carried out on the Balearic Island of Menorca. This herbarium emerges in 1999 by the initiative of the Commission of Botany, belonging to Balearic Ornithological Group (GOB) in Menorca, and the Institut Menorquí d'Estudis, in response to the need for a basic tool for further study and knowledge of the flora of the island.
From its inception, it has been a steady growth with some peaks of activity that has taken the HGM to house nowadays 1,031 records that include 577 different taxa distributed in 309 genera and 83 families of vascular plants, mostly natives of Menorca. All these records are fully computerized using the new 3.7 version of HERBAR, an application software designed by Francisco Pando in the Royal Botanical Garden of Madrid which has been adopted as standard by the AHIM (Association of Ibero-Macaronesian Herbariums) and is recommended and supported by the Spanish Node of GBIF (Global Biodiversity Information Facility). This last point matches exactly with one of the main objectives in the future of the HGM: to house its collection of vascular plants in the large database of GBIF network with the intention of providing adequate dissemination and international relevance.
Beyond the computerization of the collection, currently the work of management and conservation of the HGM also includes the labeling process of the different sheets which contain the specimens recorded. Once labeled, these sheets will be stored in boxes already arranged alphabetically by families and genera. Meanwhile the HGM collection continues to grow thanks to the research and collect work of the Commission of Botany's scientists.

Keywords: Herbarium, Menorca, HERBAR, computerization, GBIF

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MANAGEMENT OF ENDANGERED PLANT SPECIES WITHIN THE LIFE+ RENEIX PROJECT

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The long-term management of habitats and plant species is a main objective of the Habitats Directive of the European Union. Menorca, like other Mediterranean islands, has a significant endemic flora with plant species of narrow distribution that likely require legal protection to assure a successful conservation. Moreover, it is well known that in most cases the conservation of a single species cannot be implemented with positive results without taking into account the whole habitat where it grows. From these premises, some years ago a LIFE Natura proposal (LIFE 2000NAT/E/7355) was developed in order to manage Menorca's endangered plant species. Unlike other projects, LIFE+ RENEIX (LIFE07 NAT/E/000756) proposes to proceed with conservation from an integrated point of view - that is, considering the whole context where targeted plant species are growing. Thus, in the island's particular case, this means not only developing actions designed to work on individuals (i.e. reinforcing populations, increasing knowledge about ecology, control of specific threats), but also working in a multidisciplinary way: preceding situation, habitat restoration, social awareness, etcetera. In order to clarify actions and results, four areas of the island have been selected that have the following common features: a high concentration of habitats and plant species of conservation interest, the presence of active threats that need urgently restoration actions and can be easily recognised by local people and tourists.
With this approach it is expected that the project will develop with evident positive results, not only on plant species included in the Habitats Directive, but also on many others that are of interest for conservation due to their narrow distribution (endemic) or to their significance for local people. Taken together these experiences and results may be exportable to other regions with similar problems of habitat and species conservation.

Keywords:.LIFE+ RENEIX, Habitats Directive, Menorca, endemic flora, habitat restoration, species conservation

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NEW PLANT SPECIES DESCRIBED RECENTLY FOR THE FLORA OF MENORCA: THE IMPORTANCE OF NEGLECTED HABITATS

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Within the Mediterranean region islands are usually considered to be among the richest points of conservation interest, as they hold a high concentration of unique and restricted biodiversity among this autochthonous flora. Endemicity in insular territories can be related, besides insularity itself, to other factors favouring plant differentiation like mountain ranges, geological diversity and soils singularities, or harsh environmental conditions. In the particular case of Menorca, despite the absence of highest mountains (the maximum altitude is 350 m a.s.l.), some particularities like extreme environmental conditions caused mainly by persistent, strong north winds and a diversified geology seem to be the major forces driving local speciation processes. Recently, a group of up to four new species have been described from habitats sharing several common environmental features, viz *Bellium artrutxensis, Coronilla montserratii, Euphorbia nurae and Polycarpon dunense*. They grow on sandy calcareous soils derived from coastal sand dune systems, but with a different degree of consolidation. Thus, they range from small patches of mobile sands of inland progressing dune systems (e.g., *P. dunense*) to thin sandy soils originated by erosion of fossilized limestone dunes (e.g., *B. artrutxensis* and *E. nurae*). Soil characteristics of these habitats favour a vegetation of small annual plants with a high degree of species diversity, showing some physiognomic similarities with *Isoetes* communities of sandy siliceous soils. At all what is shown after years of studying these miniature grasslands is that even habitats apparently not favourable for speciation can hold different plant communities. Some of them can be linked to very local environmental conditions that are singular and thus favouring plant diversification and ultimately speciation.

Keywords: sandy soils, speciation, *Bellium, Coronilla, Euphorbia, Polycarpon*

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FOREST HABITAT MAP OF MINORCA 2007. A TOOL FOR FOREST MANAGEMENT AND BIODIVERSITY PRESERVATION

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Life+BOSCOS (LIFE+07ENV/E/000824) is a project developed by the Minorquian government (CIMe) with the co-funding of the European Union's LIFE+ program, which

aims to develop tools and sustainable management strategies to deal with climate change effects on mediterranean forests. A new forest habitat map of Minorca (the second largest island of Balearic Islands) has been developed at Institut Menorquí d'Estudis (IME), as an analysis and management tool to define forest management guidelines for the adaptation to climate change, as well as simplify and facilitate the work of forest planning at both local and regional scales.
This Forest Habitat Map of Minorca is nowadays the most detailed habitat map (scale 1:25000) ever made in Minorca and one of the first in the Iberian Peninsula. The map focuses exclusively on forest habitats and covers 51% of island's surface (358 km^2). The map uses two of the most widely used habitat classifications : (1) the *Habitat types of Community Interest* settled by Council directive 92/43/CEE and listed under *Interpretation Manual of European Union Habitats* (version EUR27), as well as (2) the *Corine biotopes* settled by EU CORINE program's *CORINE Biotopes project.*
The map has been digitized using Geographic Information System's techniques and has also been extensively validated by field campaigns (over 40% of its surface has been visited). The resulting cartography includes 30 different forest habitat (according to *CORINE Biotopes project* classification), distributed in nine *Habitat types of Community Interest*. The map contains almost 4000 landscape units, each one of which holds a maximum of three different habitats. Thanks to its level of detail and thoroughness, the forest habitat map will be a helpful tool when drafting the guidelines for forest management of Minorca and, at the same time, will allow drawing forest management plans of the properties of the island.

Keywords: Mapping, Forest Habitat, Habitat types of Community Interest, HIC, CORINE Biotopes Project, Minorca, LIFE+

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ENDANGERED PLANT SPECIES OF MARETTIMO ISLAND (SICILY, ITALY)

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Marettimo Island (Egadian Archipelago, NW Sicily), unlike the surrounding areas of Levanzo and Favignana, and also of Sicily itself, has not been affected by the Quaternary glaciations (FRANCINI & MESSERI, 1956), so that the vegetation physiognomy is quite different; just think of e.g. the *Rosmarinus officinalis* and *Erica multiflora* macchia-garrigue, very common here, but residual elsewhere and located within restricted geographical areas. The flora peculiarity itself, represented by 612 infrageneric taxa (GIANGUZZI et al., 2006), is the result of the vicissitudes that have affected phytogeographic flows in this sector of the Mediterranean Sea. There are different endemic species, some of which paleoendemic, or entities of phytogeographic significance, with small populations and therefore "at risk".
The study investigates these entities, highlighting the problems related to their conservation. Among the exclusive endemic species to the Island, there are *Allium franciniae*, *Helichrysum errerae* var. *messerii*, *Limonium tenuiculum*, *Bupleurum dianthifolium*, *Oncostema hughii*, *Thymus richardii* subsp. *nitidus* and *Anthemis*

secundiramea var. *cosyrensis*; a species is endemic to the Egadian Archipelago (*Brassica macrocarpa*). Moreover, many other taxa are to be mentioned: some of them are endemic to Sicily, i.e. *Asperula rupestris*, *Bellevalia dubia*, *Euphorbia papillaris*, *Plantago afra* subsp. *zwierleinii*, *Pseudoscabiosa limonifolia* and *Ranunculus spicatus* subsp. *rupestris*, or to the Central Mediterranean area, such as *Crocus longiflorus*, *Dianthus rupicola* subsp. *rupicola*, *Iberis semperflorens*, *Pimpinella anisoides*, etc. Many other plants are absent or very rare/threatened at a regional level, such as *Aristolochia navicularis*, *Daphne sericea*, *Erodium maritimum*, *Lagurus ovatus* subsp. *vestitus*, *Periploca laevigata* subsp. *angustifolia*, *Reichardia tingitana*, *Simethis mattiazzi*, *Thymelaea tartonraira*, etc.

Other entities, rather frequent in the nearby Sicilian coast, retain only one or few relict stations in Marettimo, e.g. *Hedera helix*, *Teucrium fruticans*, *Chamaerops humilis*, *Phillyrea latifolia*, *Cyclamen hederifolium*, *Ephedra fragilis*, locally represented by very few individuals, for which therefore protection actions would be necessary.

Keywords: Vascular flora, Conservation of species, Marettimo Island (Channel of Sicily), Phytogeography.

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INVESTIGATIONS INTO THE DISTRIBUTION OF FLORISTIC EMERGENCIES OF PANTELLERIA ISLAND (CHANNEL OF SICILY, ITALY)

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Pantelleria Island is the emerged part of an imposing volcano that rises along the "contact rift" between Africa and Europe. It's dominated by Montagna Grande summit (836 m), followed by Monte Gibele (700 m) and other inactive volcanic cones. According to the most recent contributions, the vascular flora is composed of approximately 600 infrageneric entities (BRULLO et al., 1977; GIANGUZZI, 1999a, 1999b), a rather small number compared to the territory extent, but due to its young geological age and to geographic isolation in the Channel of Sicily.

This study focuses on the floristic emergencies of the island, which includes several endemic species, all neogenic, among which are exclusive: *Limonium cosyrense*, *Matthiola incana* subsp. *pulchella*, *Medicago truncatula* var. *cossyrensis*, *Trifolium nigrescens* subsp. *nigrescens* var. *dolychodon* and *Serapias cossyrensis*. Among other endemic species, which are present in the near areas, it can be mentioned *Anthemis secundiramea* var. *cosyrensis*, *Filago lojaconoi* and *Senecio leucanthemifolius* subsp. *crassifolius*. There are, furthermore, various elements of a certain phytogeographical

significance, almost all from the South, as *Pinus pinaster* subsp. *hamiltonii*, *Periploca laevigata* subsp. *angustifolia*, *Genista aspalathoides*, *Carex illegitima*, *Andryala rothia* subsp. *cossyrensis*, *Limodorum trabutianum*, *Ophrys sphegifera*, *Brassica insularis*, *Tillaea alata*, etc.
Among the most vulnerable biotopes, for their peculiarity and limited distribution, there are fumaroles and "Specchio di Venere" lake. In the fumarolic series it's possible to find rare species, such as *Radiola linoides*, *Kickxia cirrhosa*, *Isoetes duriei* and *Ranunculus parviflorus*.
Along the banks of "Specchio di Venere", located within a calderic depression, there's *Schoenoplectus litoralis s.l.*, whose insular population is considered critical, in addition to the very rare *Limonium secundirameum*, considered seriously threatened. On this basis, therefore, the reflections of the human pressure on the biotope are not to be neglected, especially pronounced during the summer, so that it's one of the most significant threat.

Keywords: Vascular flora, Conservation of species, Pantelleria Island (Channel of Sicily), Phytogeography.

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PHYLOGEOGRAPHY OF *QUERCUS COCCIFERA* S.L. IN THE MEDITERRANEAN BASIN.

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In the context of compared phylogeography of Mediterranean species, *Quercus coccifera* L. is studied through cpSSR markers. Plant material was collected in 66 natural populations widespread around the Mediterranean Basin, including the most relevant archipelagos. Five out of the six universal primers tested were variable with a total of 18 different alleles, giving 34 haplotypes. A map of haplotypes in the sampled populations is presented. The analysis using Permut software shows high levels of genetic variability and structure (Rst = 0.982 > Gst = 0.87, p = 0.000). Two AMOVA analysis were performed based on geographical and bayesian distribution. In the first one, most of the variability (65.5%) was among groups, being lower among populations within groups (33.4%), while in the second analysis both of them were similar (50.6%

and 45.6%, respectively). Bayesian analysis with BAPS software distributed the populations into 3 groups, one of them (37 populations, 11 haplotypes), centered in the Western of the Mediterranean Basin, and the Cyrenaic region, the second one in the Middle East, Turkey and Cyprus (13 populations, 11 haplotypes) and the third (16 populations, 13 haplotypes) present in most of the main islands (except Cyprus), Southern France, Balkans and Northern Africa (Argelia and Tunisia). All these results, together to the haplotypes network constructed with TCS software, suggest 2 different migrations routes from the Iberian Peninsula were the basal haplotype is located, one through the Siculo-Tuniasian Strait and the other one through the Northern Africa to Middle East and Turkey.

Keywords: *Quercus coccifera*, Kermes oak, cpSSR markers. Phylogeography, Migration routes

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IN SITU CONSERVATION STRATEGIES OF A THREATENED SPECIES: THE CASE OF CAREX PANORMITANA GUSS. IN SICILY

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Carex panormitana Guss. (Cyperaceae) is a species distributed in Sicily and Sardinia, where, according to ARRIGONI (1984), represents a neoendemic vicariant of *Carex acuta* Good. In Sicily it's located in only one place in the north-west, near Palermo. This rhizomatous geophyte, sciaphilous-hygrophilous, typical of river banks, is a species of community interest listed in the Habitats Directive 92/43/EEC under annex II as priority species and under annex IV; it's also placed inside a national red list (CONTI et al., 1997), indicated as vulnerable (VU), unlike the Sicilian subpopulation considered threatened (RAIMONDO et al., 1994).
Carex panormitana is actually located in the downstream section of the "Ponte delle Grazie" in the Oreto river, whose station is also the *locus classicus* of the species. According to the investigation carried out, the subpopulation, rather fragmentary, is particularly threatened with extinction. The main causes of threat are three:
1 - Extreme simplification of the original river morphology with rectification of the river channel and deletion of bends, meanders, river beds, etc.
2 - Significant reduction of radiation under the canopy, since the ripisilva often tends to occupy the entire floodplain area; this leads to a change in the habitus of the species, from heliophilous to sub-sciaphilous.
3 - Eutrophication of water body, as result of the urbane sewage of the upstream areas.

In order to elaborate a specific plan for the *in situ* conservation of the considered subpopulation, preventing its further regression, which could also lead to the extinction in the medium term, we suggest the following actions:
1 - restoration of the typical riverine morphology of the terminal stretch of the river;
2 - periodic cleaning interventions of the riverbanks, aimed at restoration of the typical environmental balance of *Carex panormitana*;
3 - reduction of organic load.

Keywords: Oreto River (Palermo), Habitats Directive 92/43/EEC, Conservation of species, Phytogeography.

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ESTABLISHMENT OF A PLANT MICRO-RESERVE NETWORK IN CYPRUS FOR THE CONSERVATION OF PRIORITY SPECIES AND HABITATS.

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The project titled 'Establishment of a Plant Micro-reserve Network in Cyprus for the Conservation of Priority Species and Habitats' (PLANT-NET CY) is implemented under the EU LIFE+ programme. Its main objective is to improve the conservation status of four priority plant species and two priority habitat types of the EU Habitats' Directive that are found exclusively in Cyprus, through the establishment, monitoring and management of a network of five Plant Micro-Reserves (PMRs). The PMRs approach was initially developed about 15 years ago in Valencia (Spain) and since then it has been successfully implemented in several other parts of Europe. This concept is now widely accepted as one of the most effective practices towards the conservation of plant diversity in small land plots that are of peak value in terms of plant richness, endemism or rarity. The project introduces an integrated approach for the conservation of the targeted species and habitats through monitoring of all environmental parameters affecting the targeted species and their habitats, implementing specific *in situ* conservation actions, implementing complementary *ex-situ* conservation actions

and promoting public awareness and controlled public involvement in the conservation activities. The project is expected to secure the protection and sound management of the targeted species and habitats and increase the participation of local people/stakeholders in the design and implementation of conservation initiatives. Moreover, PLANT-NET CY brings together scientists who have been involved in the PMRs approach over the last 15 years to facilitate networking and exchange of scientific information and best practices.

Keywords: Plant Micro-Reserves, priority species, priority habitats, plant conservation, Cyprus.

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ENDEMIC TAXA OF *ASPERULA* L. SECT. *CYNANCHICAE* (DC.) BOISS. ON THE MEDITERRANEAN ISLANDS

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Ultimate researches on molecular phylogeny (based on cpDNA) of the family *Rubiaceae* confirmed that the genus *Asperula* is not monophyletic (Soza & Olmstead 2010). *Asperula* L. sect. *Cynanchicae* (DC.) Boiss consists of approximately 60 taxa with a hotspot of diversity in the Adriatic and Aegean Basin. Around the Adriatic Basin several endemic taxa of the *Asperula* sect. *Cynanchicae* ser. *Paleomediterraneae* have been recorded based on morphological, caryological ecological and geographical differences. The most interesting taxa are those that belong to the *Asperula staliana* complex (Korica 1979, 1981, 1986, 1992) such are *A. staliana*, *A. woloszczakii*, *A. visianii*, *A. borbasiana*, *A. staliana* ssp. *arenaria*, *A. staliana* ssp. *issaea, A. staliana* ssp. *diomedea*. Morphologically closely related taxa are *A. garganica*, *A. calabra*, *A. crassifolia* from the Apennine peninsula, *A. deficiens* from Sardinia, *A. pauii* from Balearic islands (Peruzzi et al. 2004), *A. gussoneii* and *A. peloritana* from Sicily (Brullo et. al 2009), *A. naufraga* and *A. samia* from Greek islands (Ehrendorfer & Guterman 2000, Christodoulakis & Georgiadis 1983)*, A suberosa* from Northern Greece and *A. idea* from Crete (Schönbeck-Temesy & Ehrendorfer 1991). Geographical vicinity and punctiform distribution of these taxa in the Mediterranean makes the story of their diversification especially interesting.
The main goal of this research is resolving taxonomic incongruences among endemical taxa, discovering species-area biogeographic relationships between islands and main lands (Italian and Balkan peninsula), and assessing their genetic diversity as well as phylogenetic relationships.
Phylogenetic relationships were inferred from plastid DNA sequences (*trnH-psbA* and *matK*) and nuclear sequences (ITS). Tested populations were sampled on some Croatian islands and in Italy. Preliminary results indicate the existence of a great variability among the investigated taxa. We found interesting patterns of inter-/intra-specific polymorphism which will be further assessed in future research involving taxa from Greece and other Mediterranean islands.

Keywords: *Asperula* sect. *Cynanchicae*, phylogeny, endemism, *trnH-psbA*, *matK,* ITS

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WILD PHOENIX IN THE MEDITERRANEAN: PALEONTOLOGICAL AND ARCHAEOBOTANICAL EVIDENCE

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The number of wild palm species in the Mediterranean is restricted to *Chamaerops humilis* L. in numerous floras and monographs. However in the second half of the 20th century, the discovery of *Phoenix theophrastii* in several localities of the island of Crete (Greece), which was later found in the Aegean coasts of Turkey, and the description of

Phoenix iberica from SE Spain raised the question on the origins of these palm trees and the possibility of wild palm species in the Mediterranean other than *Chamaerops humilis*. In addition several *Phoenix* microspecies were described since the XVIII century but usually considered as varieties of *P. dactylifera* (e.g. *P. excelsior* from Eastern Spain). Are these merely subspontaneous date palms escaped from cultivation which reverted to the wild phenotypes, or remnants of ancient *Phoenix* populations which persisted during the Holocene in refuge zones, including some Mediterranean islands? In the last option, how they could participate in the domestication processes of *Phoenix dactylifera* along the Southern Mediterranean side?. Is the similarity of the external macrocharacters and appearance amongst all these taxa the expression of local phenotypes of *P. dactylifera* or a possible evidence of the introgression and genetic displacement caused by this Afro-Asian species on a rich group of Mediterranean taxa nowadays in extinction?. Here we comment the morphology of fossilized and not-fossilized remains from different sites and periods in the Mediterranean, Europe and North Africa, which can be compared with the extant Mediterranean *Phoenix.* The results here obtained advices to describe and characterize in a close future all the Mediterranean microspecies, in order to best discriminate between native and current *Phoenix* and their remnant morphological influence into the *P. dactylifera* complex.

Keywords: *Phoenix theophrastii, Phoenix iberica, Phoenix dactylifera*, Mediterranean palms, Paleobotany, Archaeobotany

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PSAMMOPHYTE VEGETATION ON THE DUNE FRONT OF ES COMÚ DE MURO (MALLORCA, BALEARIC ISLANDS). FROM ITS CONSERVATION STATUS TO THE NEED FOR ITS MANAGEMENT.

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The beach-dune ecosystems situation in Balearic Islands is characterized by its high fragmentation, mainly due to its anthropogenic pressure and the coastal management policies taken by the local administration. The economic interests have prevailed over the ecological ones, generating serious environmental impacts. Fragmentation signs are clears in both geomorphic and ecological features, mainly along the first line of the dune systems. Although there are many variables to consider, the ecological state may be considered as an important feature to take into account.
The relationship existing between geomorphic, ecological and management conditions is substantial to understand the current situation of Es Comú. In this way, it is important

to note the importance that vegetation has in this place. In fact, the disappearance of the herbaceous vegetation at the first line ha supposed loses of high sediment quantities, increasing erosion rate.
In this way we propose to contribute to the knowledge about a dune beach-system of es Comú de Muro (Mallorca, Balearic Islands) carrying out an exhaustive characterization about its ecological conditions presented along its dune front, with the purpose to establish a representative explication of its fragmentation state through the blowouts erosive shapes and foredunes state. In this order, 58 floristic inventories corresponding to each blowout analyzed have been sampled taking into account ecological variables in order to establish and propose a new management tools.
To present the field work results, Cluster analysis has been made through Bray Curtis similarity index, taking into account the 19 main herbaceous species detected along the dune front. Ecological conditions are taken out from both herbaceous and bush vegetation. In fact, the geomorphologic front dune degradation has been analyzed as well, departing from the roots of *Juniperus oxycedrus* subsp*. macrocarpa* outcrops, showing a strong correlation with the system fragmentation.
Thus, the main species of each type have been identified to know its presence/absence index, distribution, and conservation state, in order to get a clear perspective about the current situation of this place, and the potential management tools suitable to apply.

Keywords: beach-dune ecosystems, conservation, management, Mallorca, Balearic Islands.

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ECOLOGICAL QUALITY OF RIPARIAN HABITAT ASSESSMENT BY MEANS OF QBR INDEX (MUNNÉ *ET AL*., 2003) IN EPHEMERAL STREAMS OF MENORCA (WESTERN MEDITERRANEAN, SPAIN).

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In response to the increasing ecological impacts related to human activities problems and the greater social environmental concerns, policy-makers of developed countries are implementing initiatives aimed at reducing those impacts in aquatic ecosystems for restoring water quality levels found in pristine ecological status. Thus, the General Directorate of Freshwater Resources of the Balearic Islands Government in order to implement the European Water Framework Directive (WFD; 2000/60/EC) entrusted to OBSAM vegetation communities cartography and a riparian habitat assessment. Riparian vegetation is contained in landscapes where terrestrial and aquatic ecosystems meet, such as streams, river banks and river floodplains, wetlands and areas surrounding lakes. Native riparian vegetation plays an important role in

providing ecosystem services. These services include stabilisation of river banks, maintenance of water quality and water flows, habitat for aquatic species, and maintenance of biological diversity in remnant habitat.
To assess the ecological quality of riparian areas a visual index (QBR, Munné *et al*., 2003; ACA, 2006) was used. This methodology developed for Mediterranean streams catchments is based on 4 categories of a riparian habitat (vegetation cover, cover structure, cover quality and channel alterations). Scores for each category range from 0 to100, with the value 100 assigned to the highest quality and founding 5 groups. For this purpose, 19 major streams within 12 drainage basins were chosen. The streams were divided into 4 uniform geomorphological-depended categories (reaches) and each reach were divided in stretches according to fertile lowland floodplains land use. Non of the streams obtained a very good ecological quality, 2 a good ecological quality, 6 a moderate ecological quality, 8 a poor ecological quality and 1 obtained a bad ecological quality. The main threats detected were riparian vegetation clearance and its replace with pastures, animal waste, sewage input and the introduction of non-native species.

Keywords: European Water Framework Directive, QBR, riparian vegetation, ephemeral streams.

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DETAILED MAPPING OF THE DISTRIBUTION OF THE PLANT SPECIES OF INTEREST TO THE PROJECT LIFE+RENEIX IN MENORCA (PHASE I)

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We present the methodology and results of the first phase of the detailed mapping of plant species considered of interest for the project LIFE+RENEIX (LIFE+07/NAT/E/000756). The species studied are: *Anthyllis histrix*, *Astragalus balearicus*, *Cneorum tricoccon*, *Cymbalaria aequitriloba*, *Cymbalaria fragilis*, *Echinophora spinosa*, *Femeniasia balearica*, *Orobanche foetida* (*Ononis crispa* parasite), *Paeonia cambessedesii*, *Pastinaca lucida*, *Teucrium asiaticum*, *Teucrium marum*, *Thymelaea velutina* and *Viola stolonifera*. The areas of study are: Alocs-

AlPilar, Binimel.là, Sa Mesquida-Es Murtar, Pas d'en Revull (Barranc d'Algendar). The data from the first field survey (conducted during the autumn of 2010) are structured in a geographic information system, in polygons and points maps. When the populations exceed 400 m^2 they have been digitized as polygons (in some cases, when it has been considered interesting and possible, it has been used a smaller minimum area). The fieldwork was carried out over recent printed orthoimages in scales between 1:2.500 and 1:4.500 and the final GIS demarcation of the polygons has been done in more detailed scales. For smaller populations or isolated individuals the mapping information is a point layer (from captures in the field with the GPS). The database associated with the mapping contains the following information: number of individuals (adults, young, seedlings and dead), number of populations (individuals or groups of individuals), surface, conservation status (good, medium, bad) and observations. The poster describes the species found in each of the studied areas and its population data, as well as some conservation problems detected during the fieldwork. In the second phase (scheduled for 2013) the data from this first session will be updated and also it will be done the mapping of the species which have not been studied properly because of its phenology (*Orobanche foetida* i *Serapias nurrica*).

Keywords: Life+Reneix, flora of interest, GIS, detailed mapping

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SYSTEMATICS OF THE NARROW ENDEMIC SPECIES *BRIMEURA DUVIGNEAUDII* (HYACINTHACEAE)

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Brimeura is an endemic genus of the western Mediterranean region which includes three species: *B. amethystina* (L.) Salisb., endemic to north-eastern Iberian Peninsula (mountains bordering the Ebro basin), *B. fastigiata* (Viv.) Chouard, endemic to Western Mediterranean islands (Corsica, Sardinia, Majorca and Minorca), and the majorcan endemic *Brimeura duvigneaudii* (L. Llorens) Rosselló, Mus & Mayol.
Brimeura duvigneaudii was described on the basis of specimens collected in Penyal Fumat, Formentor (northern Majorca). Intraspecific morphological variation in *B. duvigneaudii* has been noted, and two groups of populations that correspond to separate areas in which plants show morphological differences (scape and flower length) could be defined. These differences were attributed to phenotypic adaptations to a humid and shady microhabitat in Coma Freda karst gorge. Indeed, variation in flower features in this species has been observed by us during the last decade, which seems to be clearly related to the geographic origin of the plants.

To clarify these relationships, we carried out a morphological study of *Brimeura duvigneaudii* (Hyacinthaceae). Morphological analyses showed noticeably variability which is correlated with geographic distribution and some ecological factors. These data led us to propose a new subspecies of *Brimeura duvigneaudii*, which is endemic to a single locality from the middle range of Serra de Tramuntana. The new taxon, which has been recently described (*Brimeura duvigneaudii* subsp. *occultata*), differs from *B. duvigneaudii* subsp. *duvigneaudii* in several vegetative (leaf anatomy and leaf width) and flower features (corolla size, corolla lobe length and shape, scape length). Data on the local distribution and ecology of the new taxon are reported. The new subspecies is restricted to a karst gorge and it is in danger of extinction, due to its small population size.

Keywords: *Brimeura*, Majorca, morphometric analysis, subspecies

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THE *THYMELAEA TARTONRAIRA* (L.) ALL. VARIATION IN SARDINIA (ITALY)

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The *Thymelaea tartonraira* L. All. (Thymelaeaceae) is a very interesting species group and it can be a good model to study morphological population variation. *T. tartonraira* is a Mediterranean species with a complex nature of variation difficult to define, like already observed by Aymonin (1971, 1974). A quite various intra specific taxonomy was carried out from different Authors, among them Tan (1980) and Galicia Herbada, (1995, 2006). All the Italian populations (among them Capri, Marettimo and Sardinia) are named *T. tartonraira* subsp. *tartonraira*, the main taxon of the W Mediterranean. *T. tartonraira* in Sardinia is a quite common species present in different coastal and mountain sites on sand dunes (e.g.: Porto Ferro), on consolidated sands of fossil dunes (e.g.: Porto Palmas) on rocks/cliff (e.g.: Porticciolo) and on Mesozoic calcareous lime-stones (all the mountain sites in this work). The variety of habitats and the presence of this taxon in a great number of sites, make Sardinia a good study site to taste and, possibly, to quantify the morphological variation in *T. tartonraira* subsp. *tartonraira*. The objective of this study is to evaluate the intra e inter population morphological variation of nine of Sardinian sites and to taste the possible discontinuities among this variation. Preliminary data from morphological analysis of vegetative and reproductive structures of *T. tartonraira* (e.g.: leaves, flowers, fruits and seeds) are taken into account, elaborated and discussed.

Keywords: Thymelaeaceae, *Thymelaea tartonraira* subsp. *tartonraira*, morphology, systematics.

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ESSENTIAL OIL COMPOSITION OF SOME *CENTAUREA* SP. (ASTERACEAE), FROM DIFFERENT ITALIAN ISLES.

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INTRODUCTION

The genus *Centaurea* (Cardueae tribe, Asteraceae) contains a very large number of species (400-700) predominantly distributed in the Old World (Greuter, 2008). Several papers on secondary metabolites of *Centaurea* species are available in the literature (Baykan-Erel *et al*., 2010), a few on volatile constituents (Rosselli *et al.*,2009; Tava *et al*., 2010; Viegi *et al.*, 2010).

OBJECTIVES

Taxonomically this genus is complex and warrants further study by new cytological and chemical techniques. Extending our study of *Centaurea* species in Italy, the aim of this research was to investigate the essential oil composition of some species from different Italian islands.

METHODOLOGY

The aerial parts (fresh and dry flower heads and leaves) of *Centaurea veneris* (Sommier) Bég. from Palmaria island, in the Ligurian Sea, *C. gymnocarpa* Moris & De Not. from Capraia island, *C. ilvensis* (Sommier) Arrigoni and *C. aetaliae* (Somm.) Bég. from Elba island in the north Tyrrhenian Sea, were collected during their flowering period (April-July) in 2006 and 2007 [nomenclature follows Greuter (2006-09)]. Voucher specimens of these plants are deposited in PI (Herbarium Horti Pisani, Pisa University). For each population, a sample of 20 individuals was collected. The volatile components of all samples were obtained by hydrodistillation and identified by GC and GC/MS. The essential oil from these four species has never previously been investigated.

RESULTS AND CONCLUSION

The volatile oils of the four *Centaurea* species contained several compounds, the most abundant of which were sesquiterpenes (34.4-61.7% of the total oil), followed by aldehydes (6.5-10.3%), alcohols (0.6-7.9%), monoterpenes (0.6-2.2%), hydrocarbons (1.7-14.7%), ketones (0.3-2.4%), acids (0.8-4.0%) and esters (0.1-4.7%). Several unidentified compounds were also detected as in other *Centaurea* sp. (Tava *et al*., 2010; Viegi *et al*., 2010). The results are discussed on the basis of the taxonomical implications of these species.

Keywords: *Centaurea veneris; Centaurea gymnocarpa; Centaurea ilvensis; Centaurea aetaliae;* Asteraceae; essential oils

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