Belgian Journal of Entomology 2 (2000) : *171-185*

Areas of high floristic endemism in Iberia and the Balearic islands : an approach to biodiversity conservation using narrow endemics

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This work was supported by the European project : CEE-EV5V-CT94-0435 (EC.DGXII-PL93917) "High Endemism Areas, Endemic Biota and the Cpnservation of Biodiversity in Western Europe", and the Spanish project : DGCYT UE 95-0038 "Áreas con alta densidad de endemismos y conservación de la biodiversidad en el oeste de Europa".

Abstract

The areas of highest concentration of narrow endemic vascular plants in Iberia and the Balearic Islands are presented. These areas were obtained from an analysis of a representative number of this kind of endemics and compared with those from previous studies of other plant groups and different methodologies. The analysis of the distribution patterns of this group of endemics reveals a very high concentration in the Baetic mountain range, of which the Sierra Nevada is particularly outstanding, and in the Balearic Islands. These results are consistent with previous studies that used other plant groups (dicotyledons, monocotyledons). However, narrow endemics are of relatively little importance in regions commonly regarded as being of high endemism (e.g., the Pyrenees and the Hercynic arc: siliceous ranges that limit the northern "meseta" towards the West and the South). The same geographical units are highlighted in relation to the endangered or vulnerable narrow endemic group, whereby the highest values are seen in the Sierra Nevada and the Balearics, while that of the Pyrenees is notably low. The combined analysis of the areas of narrow endemics and the network of protected areas reveals notable deficiencies in the protection of rare and threatened flora.

Keywords : Vascular plants, Endemism, Iberian Peninsula, Plant Conservation.

Introduction

The Iberian Peninsula and the Balearic Islands are areas of great biogeographic interest. The highly original flora and the high level of endemism of these territories are related to their considerable orographic and climatic diversity, geomorphological and soils complexity, their extreme southwestern European location, and their marked isolation produced by insularity or the 'peninsular effect'.

Independently of the marked isolation, the floristic richness and numerous endemics of the western Mediterranean are the result of geological and climatic history, and the ecotonic situation between separately evolving floristic groups, derived from Laurasia and Gondwana. The intercontinental bridges, which compartmentalized the Tethys sea, allowed the adjacent floristic elements to come into contact with each other, thereby greatly increasing the diversity in terms of the number of taxa and adaptations. In addition, the great changes that took place after the Miocene (aridification and cooling, orogenesis produced by the convergence of the lithospheric plates, desiccation of the Mediterranean and the lakes of the Iberian inland, quaternary glaciation) were a spur to speciation. Moreover, the quaternary glaciations, which were responsible for the recent floristic impoverishment of Central Europe, had a much smaller effect in Spain, allowing the immigration and the refuge of many taxa in these latitudes.

The Iberian Peninsula and the Balearic Islands are among the richest and most floristically original territories of the region, in comparison with continental Europe and the Mediterranean itself. Although the exact number of taxa will be difficult to determine until such time as the taxonomic revision of the *Flora Iberica* (CASTROVIEJO *et al.*, 1986-99) is completed, some authors have estimated that there are between 7000 and 8000 species and subspecies of vascular plants (CASTROVIEJO, 1997; NIETO FELINER, 1999).

With respect to endemism, the total of 1500 exclusive taxa of flowering plants (MORENO SAIZ & SAINZ OLLERO, 1993) may be increased to 1800-1900 by the end of work in progress (as estimated from the rate of increase calculated from the eight volumes of the *Flora Iberica* that have been published or are in preparation). Although this work is describing new endemic species, ongoing studies of north African flora, in particular those of the Baetic-Rifan, reveal some species as being common that had been classified as Iberian endemics. We estimate that the rate of endemism of this flora will remain at approximately the current value of 25-30%, although perhaps it is useful to point out that dicotyledons feature more endemics than monocotyledons (30% and 18%, respectively) (MORENO SAIZ & SAINZ OLLERO, 1992). Figure 1 shows the relative density of the endemics of some of the related nearby territories: those of the Macaronesian and the Mediterranean Islands are the most striking, followed by those of the Mediterranean peninsulas. All have much higher levels of endemism than do the countries of north and central Europe.

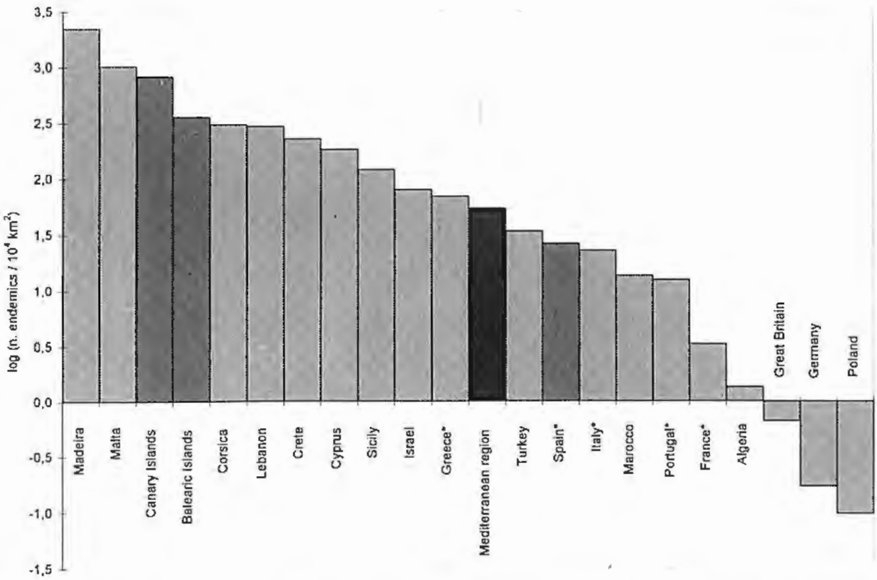

Fig. 1. Density of endemisms of the countries and archipelagos of Europe and the Mediterranean. Asterisks indicate the peninsular portions of the respective countries. Data from DAVIS *et al.* (1986) and MÉDAIL & QUÉZEL (1997).

Material and methods

It is currently impractical to carry out a study of the areas of high floristic endemism in the Iberian Peninsula and the Balearics through use of the 10×10 km UTM grid and considering the total number of plant endemics. This is due to the aforementioned floral richness of the territory and the incompleteness of our chorological knowledge. There are two alternative approaches in the face of this problem:

- to restrict the study to a less important taxonomic group of vascular plants. This was the option adopted in previous studies that presented areas or points of maximum concentration of endemics using the network of UTM 10×10 grid: monocotyledons (MORENO SAIZ & SAINZ OLLERO, 1992) and pteridophytes (MORENO SAIZ *et al.*, 1996).

- to select from the assembly of endemics in such a way as to obtain a representative and manageable number of taxa.

Narrow endemics may serve to reveal areas of high endemism, particularly relevant to the planning of conservation strategies. For this reason, in the current study a sample group was selected comprising the most stenochorous endemic vascular plants and those which were rarest or most threatened (see Appendix I).

An initial selection of the species considered a combination of the following criteria:

- high stenochory: endemic species with very reduced distributions, i.e., present in no more than ten UTM grid squares.

- high taxonomic stability: species whose taxonomic status has been confirmed by recent studies or have never changed. Taxa below species level were excluded.

- complete and reliable chorological information.

Using the resulting selection, species were then grouped with respect to the number of grid squares in which they occurred (1,2,...10), and a further criterion was applied to each group:

- maximum level of rarity or threat to existence: priority was given to species included in the IUCN categories of 'Endangered', 'Vulnerable', and 'Rare', taking Annexe II of the Directive 92/43/CEE as a principal reference (DOMÍNGUEZ *et al.*, 1996).

This latter criterion increases the practical potential of the work, since its most immediate application and one of its objectives is to allow the evaluation of areas of high endemicity oriented towards the conservation of the floristic diversity.

After applying the aforementioned criteria, a list of 120 species was derived, which comprised around 12% of the total number of endemics.

The 10×10 km UTM grid squares and natural regions in which each species occurs were registered. The natural regions used are those that appear in the sectorization of the Iberian Peninsula and Balearics proposed by SAINZ OLLERO & HERNÁNDEZ BERMEJO (1985).

Distribution maps, either previously published or those produced especially for this study, were used. The use of this grid, as generally accepted in such studies, allows not only the areas of maximum concentration of narrow endemics to be identified, but also the comparison of distribution patterns with those obtained in previous studies from other groups and the same type of distribution maps. The use of natural regions is convenient for referring to or translating the distributions given in the UTM format to natural geographic units. Although these are less accurate and useful for comparing purposes, they are easier to interpret and more informative when it comes to reporting results.

A density map (number of species per each 100 km^2 square) was produced from the distribution maps (Fig. 2). Mapping of density, as a measure of the geographic diversity of the species, has been used to delimit the areas of high endemism that, due to richness of rare or threatened species, constitute territories of special interest for the conservation of floristic diversity.

Finally, the degree of cover of this fraction of the Iberian-Balearic endemic flora was examined with respect to the network of protected areas (National, Natural and Regional Parks) (CASTRO-HENRIQUES, 1988; FERNÁNDEZ & DE LUCIO, 1994).

Maps were produced with the aid of the G.I.S. program MapInfo Professional 4.0.

Results

The combined analysis of the distribution of the 120 selected narrow endemic species reveals an uneven pattern in the studied territory (Fig. 2). Of the 6641 total squares, 396 (6% of the whole area) harboured at least one endemic. There are large areas from which this type of endemism is almost absent: both mesetas (CV, CN, SI, EX), the central section of the Ebro valley (E), the Guadiana basin (EX, A), the Guadalquivir valley (G) and the far northwest (NW, MG). The scarcity in the Spanish Sistema Central (SC) and on the Cantabrian coast (LC, V) is also notable. In general, there is a greater abundance in the eastern half of the territory, including the Balearics, and in particular the mountainous systems.

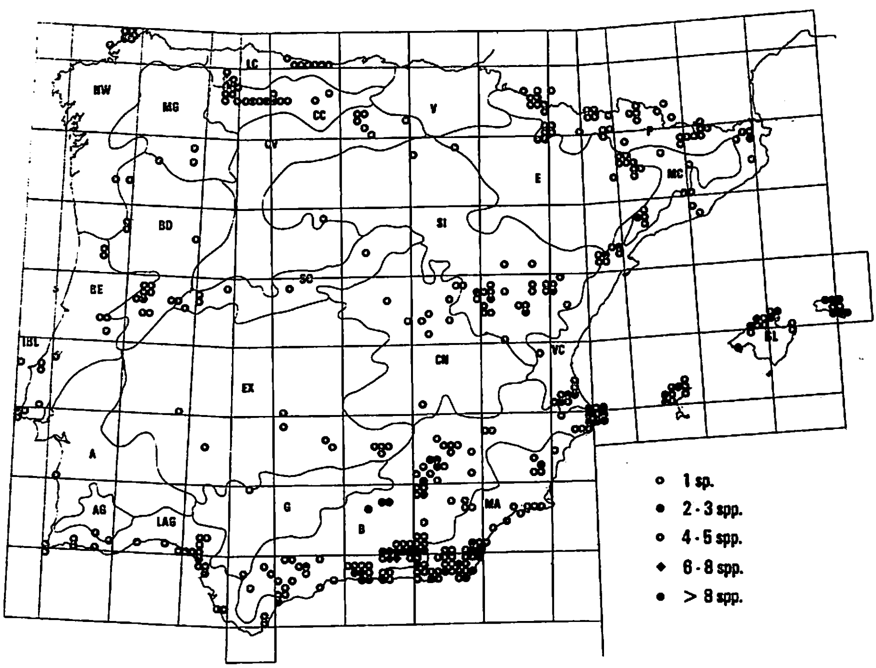

Fig. 2. Map showing the density of narrow endemics (species number per 10×10 km UTM grid square) in the Iberian Peninsula and the Balearic Islands.

The Baetic mountain ranges (B) and the Balearic Islands (BL) are by far the regions that most benefit from the originality resulting from this endemics (Fig. 3). The highest concentration occurs in the Sierra Nevada, accounting for 13% of the endemic narrow flora but in an area of less than 1500 km^2. Of particular note is the presence of 11 species in the square 30SVG60 and 6-8 species in each of three adjacent cells (30SVG70, 30SVG69, 30SVG79). Such

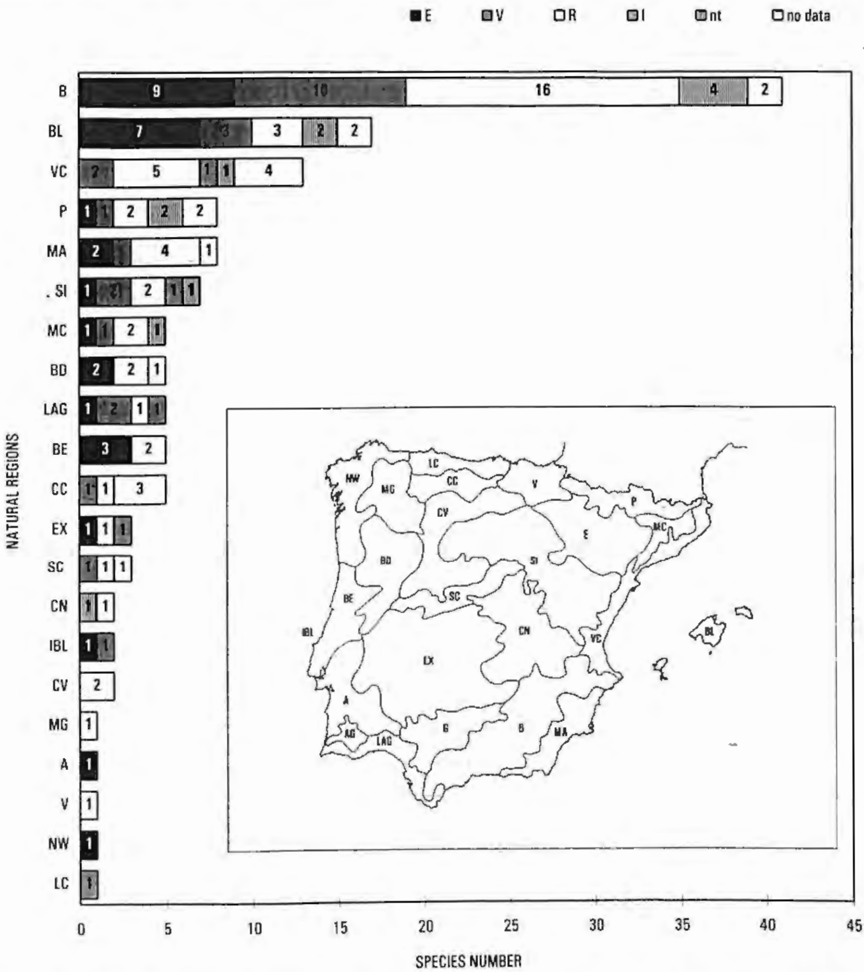

Fig. 3. Number of narrow endemics and their status of risk in the natural regions of Iberia and the Balearics. B: Baetic ranges; BL: Balearic Islands; VC: Valencian-Catalonian region; P: Pyrenees; MA: Murcian-Almerian region; SI: Sistema Ibérico; MC: Catalonian Mountains; BD: Lower Duero; LAG: Gaditano-Onubo-Algarvian coast; BE: Beira; CC: Cantabrian range; E: Ebro basin; EX: Extremadura; SC: Sistema Central; CN: Castilla-La Mancha; IBL: Berlenga and Farilho Islands; CV: Castilla-León; MG: Galician massif; A: Alemtejo; V: Basque Country; NW: Northwest coast; LC: Cantabrian coast. E: Endangered; V: Vulnerable; R: Rare; I: Indeterminate; nt: Not threatened.

values were not recorded in any other part of the territory studied (Fig. 2). Moreover, considering the natural regions to which the distributions have been referred, the extraordinary concentration (16 species) in a small area such as the Sierra Nevada has to be highlighted, compared with other regions (Balearic Islands; Murcian-Almerian region, MA; Valencian-Catalonian region, VC; Pyrenees, P) that are also rich in endemics but whose areas are 3, 5, 8 and 10 times greater, respectively (Fig. 3).

There are further grid squares in other Baetic sierras (Cazorla-Segura, Tejeda, Gádor) and the main Balearic Islands that feature 4 or 5 species. There are no cases of more than three species occurring together in the same grid square outside these two natural regions: Baetic ranges and Balearic islands (Fig. 2).

Other concentrations of narrow endemics (two or more adjacent squares with two or three species in each) are found in the mountains near the coast between the provinces of Valencia and Alicante (VC, B), a considerable part of the rest of the Baetic range (Alcaraz, Mágina, Almijara), the northeast and south of Almería (MA) and the central section of the Cantabrian range (CC). Individual squares with 2-3 species, representing isolated enclaves of endemism, are scattered throughout the rest of the territory (Fig. 2).

Of the species considered, 72% are classified within the 'Endangered', 'Vulnerable' and 'Rare' categories of the IUCN. Of this group of rarest or most threatened species, 41% inhabit the Baetic ranges, of which 17% occur in the Sierra Nevada, and 15% are found in the Balearic Islands. In contrast, it is notable that the Pyrenees (P) have a low percentage of narrow species in these IUCN categories: less than 5% of the total number of species considered. Effectively, of the ten regions with the most restricted species (Fig. 3), all except the Pyrenees have more than 50% of their taxa classified in the highest risk categories (E, V and R).

Discussion

The analysis of the distribution of a representative group of the narrow endemics of the Iberian Peninsula and Balearics allows the detection and, in this case, the confirmation of some geographical patterns globally followed by this element. Despite their reduced number and area, they clearly delimit those areas that are particularly privileged by the Iberian-Balearic endemism, although there are some zones that show barely a hint of endemism due to their low density of occupation.

The distribution of grid squares containing narrow endemics is generally highly uneven. Mountainous zones predominate, principally those of the Mediterranean environment, followed by the islands and the southern coastal strip. The role of the Iberian mountains highlights the fact that at least 60% of the Iberian endemics grow in alpine or montane habitats (GÓMEZ CAMPO & MALATO BELIZ, 1985).

In this study, the poverty of the fluvial and inland endorrhoeic basins does not seem to be due to any lack of sampling in these most disturbed zones, as only those species with a reasonably well-known chorology were selected. Nevertheless, these territories with their continental climate and sedimentary substrates have favoured extensive colonisation by their endemics, and even the predominance of the taxa shared with habitats similar to those of North Africa, which are very stable and originated in the Tertiary (MONTSERRAT & VILLAR, 1972; MORENO SAIZ & SAINZ OLLERO, 1992).

The different sierras of the Baetic system are clearly represented in the map (Fig. 2) and include the great majority of the grid squares with high number of narrow species. The Baetic endemisms are not usually distributed along the entire range, but rather are restricted to a portion of it and are normally isolated from other sierras by younger Miocene substrates. HERNÁNDEZ BERMEJO & SAINZ OLLERO (1990) point out the Baetic chain as the region of endemic flora with the greatest predominance of narrow species, which are dominant compared with those shared with other peninsular territories.

The great floristic originality found in all massifs is particularly striking in the case of the Sierra Nevada, which has the highest summit of Iberia, where siliceous and calcareous rocks alternate and where all the thermotypes found in the Mediterranean region are present (BLANCA & MOLERO MESA, 1990). These factors assure that the Sierra Nevada is not only the enclave of highest endemism in the Peninsula (DAVIS *et al.*, 1994; CASTRO PARGA *et al.*, 1996), but also probably in the entire European continent (GÓMEZ CAMPO *et al.*, 1984; BLANCA *et al.*, 1998).

The Balearic Islands, despite having a lower percentage of endemics than the Iberian Peninsula (CARDONA & CONTANDRIOPOULOS, 1979; MÉDAIL & QUÉZEL, 1997), are notable for the density of exclusive plants that grow in their mountains and rocky coasts. As well as its own insularity, the historic isolation of Mallorca and Menorca from Ibiza and Formentera, has also increased the number of endemics restricted to a single island (ALOMAR *et al.*, 1997).

The Pyrenees and the Cantabrian Range, the mountainous axes of the peninsular Eurosiberian fringe, are not clearly distinguished in these results. This contrasts with previous studies that cited 14% endemism in the Pyrenees or identified both massifs as centres of accumulation of restricted species (FAVARGER, 1972; HINZ, 1990). However, HERNÁNDEZ BERMEJO & SAINZ OLLERO (1984) have previously drawn attention to the 'exporter' character of the endemic flora of the Cantabrian Range in their analysis of Iberian phytogeographic barriers. Even considering a certain bias as a result of the lack of chorological studies, two possible causes can still explain the dominance of "wide" endemics: a) the existence of a broad group of species common to both massifs, and b) the great extension and relative continuity of the alpine belts in both massifs (for instance, just in the Pyrenean axis there are nor less than 30 grid squares featuring altitudes greater than 2000 m).

As Pyrenees and Cantabrian range, the Hercynic arc is not clearly distinguised in this study, with the exception of Serra da Estrela. This result is consistent with the study of MÉDAIL AND QUÉZEL (1997), but not with the results obtained from the study of endemic monocotyledons, which featured a very similar number of taxa and scale of study to that undertaken here (MORENO SAIZ & SAINZ OLLERO, 1992). A large contingent of mountainous species (*Narcissus, Festuca, Trisetum, Luzula*) follow this arc of elevations, from the centre of the Peninsula to its northwest, where the geological substrates are very similar and there are no effective barriers to limit dispersal of species. The marginal location of Estrela with respect to the principal arc may explain its greater importance.

The eastern half of Iberia, which is geologically calcareous in nature, is much richer in narrow endemics than the western half, which is generally acidic. This is the tendency reflected by the endemic Iberian dicotyledons (MORENO SAIZ & SAINZ OLLERO, 1993), a group that on the other hand dominates in the species selected for this study. The recent origin of the calcareous eastern mountains, the pronounced orography that causes erosion of the limestone and dolomite, and the distance between elevations, all of them facts which don´t occur in the siliceous western mountains, may explain these differences.

The range-size rarity patterns revealed by the pteridophytes are only partially consistent with these results (MORENO SAIZ *et al*, 1996). The narrow pteridophytes, irrespective of their endemicity to the Peninsula and the Balearics, are present in the mountains and the islands, although more markedly on the Atlantic coast (near the Strait of Gibraltar, the Cantabrian coast, and the Serra da Sintra, the westernmost point of continental Europe). The greater water requirement of this group, with the persistence of subtropical and Macaronesian elements in coastal enclaves may explain the divergence with respect to the distribution pattern of the narrow endemics(PICHI SERMOLLI *et al.*, 1988).

Some of the territories mentioned above have also proved to be of significance in other recent studies of plant diversity in the western Mediterranean (CASTRO PARGA *et al.*, 1996; MÉDAIL & QUÉZEL, 1997; HUMPHRIES *et al.*, 1999). These studies highlighted the 'hot-spots' of taxon richness and endemism. The Baetic mountain range, the Balearic Islands (either separately or as part of the Tyrrhenian archipelago), but also the Pyrenees were identified as significant centres of biodiversity. Their high level of endemism, and thus the unique and irreplaceable character of their flora (WILLIAMS *et al.*, in press) qualifies them for inclusion within the network of 'Important Plant Areas' of Europe that is currently being designated (OLDFIELD, in press).

Figure 4 shows that only a part of the areas of greatest Iberian and Balearic endemism is protected as National and Natural Parks. This is due to the fact that plant conservation has only recently become a major criterion in the designation of such areas (CASTRO PARGA *et al.*, 1996), and because of conflicts of interest with the development of tourism and other projects. For example, the Balearic Islands, with the exception of the islet of Cabrera, still lack Parks

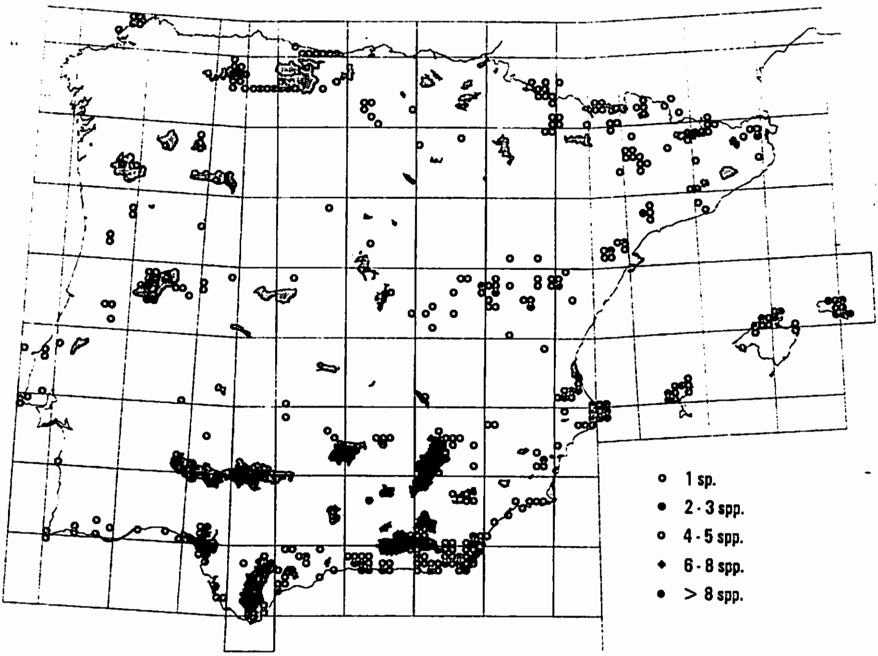

Fig. 4. Map showing the network of protected areas (National, Natural and Regional Parks) in the studied territory, superimposed on the abundance of narrow endemics.

that guarantee the conservation of their endemic flora that is now threatened by urban development and the abandonment of traditional land-use patterns. Andalusia is the area with the greatest percentage of protected territory, but there are still some Baetic sierras, most notably Gádor or the Tejeda-Almijara group, that require conservation, and in which are found a considerable number of species that feature in the EC Habitats Directive (DOMÍNGUEZ LOZANO *et al.*, 1996). The sierras of Alicante, which have recently been affected by fire, are another of the zones in which the narrow endemic richness is set against a deficient network of protected areas, although the recent establishment of a network of 'microreserves' by the Autonomous Valencian Community is an attempt to deal with the problem. Finally, the southern Sistema Ibérico entirely lacks Parks, and neither do the important pre-Pyrenean enclaves or the coast of the Algarve, particularly the emblematic San Vicente Cape.

The highest concentration of endangered or vulnerable narrow endemisms occurs in the Baetics, above all in the Sierra Nevada (7 species), followed by the Balearic Islands. The recent elevation of the Sierra Nevada to the category of National Park gives some hope for the conservation of its flora, even though plans for its recovery that carry legal weight in Spain remain to be implemented, and have not even been announced for almost all the plant species that appear in the National Catalogue of Threatened Species.

Appendix I. List of narrow endemics studied with additional information concerning chorology and conservation status.

Species	Family	Squares *	Natural Region **	IUCN***
Acantorrhinum rivas-martinezii	*Scrophulariaceae*	1	SC	no data
Allium grosii	Alliaceae	3	BL	R
Allium melananthum	*Alliaceae*	9	MA	R
Allium rouy	*Alliaceae*	1	B	E
Androcymbium europaeum	*Liliaceae*	6	MA	E
Androsace pyrenaica	*Primulaceae*	10	P	nt
Androsace rioxana	*Primulaceae*	1	SI	E
Anthemis altissima	*Compositae*	6	VC	no data
Anthyllis hystrix	*Leguminosae*	4	BL	V
Antirrhinum australe	*Scrophulariaceae*	10	B, CN	nt
Antirrhinum charidemi	*Scrophulariaceae*	2	MA	R
Antirrhinum valentinum	*Scrophulariaceae*	3	VC	nt
Apium bermejoi	*Umbelliferae*	1	BL	E
Armeria berlengensis	Plumbaginaceae	1	IBL	V
Armeria godayana	*Plumbaginaceae*	5	SI	I
Armeria pseudoarmeria	*Plumbaginaceae*	2	BE	E
Armeria splendens	*Plumbaginaceae*	5	B	nt
Asphodelus bento-rainhae	*Liliaceae*	2	BD	E
Astragalus tremolsianus	*Leguminosae*	1	B	R
Athamanta vayredana	*Umbelliferae*	4	B	no data
Bellevalia hackelii	*Liliaceae*	8	A, LAG	E
Biscutella dufourii	*Cruciferae*	7	B, VC	no data
Borderea chouardii	*Dioscoreaceae*	1	P	E
Brassica balearica	*Compositae*	2	BL	R
Carduus paui	*Compositae*	8	SI	R
Centaurea borjae	Compositae	5	NW	E
Centaurea citricolor	*Compositae*	6	EX	R
Centaurea gadorensis	*Compositae*	4	B	R
Centaurea pulvinata	*Compositae*	6	B	R
Centaurium somedanum	*Gentianaceae*	7	CC	V
Coronopus navasii	*Cruciferae*	2	B	E
Crepis granatensis	*Compositae*	4	B	V
Cytisus moleroi	*Leguminosae*	2	B	E
Daphne rodriguezii	*Thymelaeaceae*	5	BL	E
Delphinium bolosii	*Ranunculaceae*	1	MC	E
Dryopteris corleyi	*Dryopteridaceae*	7	LC	I
Erigeron frigidus	*Compositae*	3	B	V
Erodium boissieri	Geraniaceae	1	B	R

Erodium celtibericum	*Geraniaceae*	7	MC, SI	V
Erodium paularense	*Geraniaceae*	2	SC, SI	V
Eryngium grosii	*Umbelliferae*	3	B	V
Euphorbia margalidiana	*Euphorbiaceae*	1	BL	E
Euzomodendron bourgaeanum	*Cruciferae*	9	MA	R
Femeniasia balearica	*Compositae*	3	BL	E
Festuca clementei	*Gramineae*	4	B	V
Galium viridiflorum	*Rubiaceae*	10	B	R
Gaudinia hispanica	*Gramineae*	6	LAG	I
Genista dorycnifolia	*Leguminosae*	8	BL	V
Geranium cataractarum	*Geraniaceae*	9	B	V
Gypsophila bermejoi	Caryophyllaceae	9	CN, CV	no data
Gypsophila montserrati	*Caryophyllaceae*	7	B	V
Gyrocarium oppositifolium	*Boraginaceae*	1	EX	E
Hieracium lainzii	*Compositae*	7	CC	no data
Hieracium vegaradanum	*Compositae*	4	CC	no data
Hippocrepis valentina	*Leguminosae*	8	B, VC	R
Hymenostemma pseudoanthemis	*Compositae*	8	LAG	V
Jurinea fontqueri	*Compositae*	1	B	V
Laserpitium longiradium	*Umbelliferae*	2	B	E
Leontodon microcephalus	*Compositae*	5	B	R
Leucanthemum favargeri	*Compositae*	7	P	no data
Leucanthemum lacustre	*Compositae*	3	BE	no data
Leucanthemum montserratinum	Compositae	4	MC, VC	R
Limonium aragonense	*Plumbaginaceae*	3	SI	V
Limonium boirae	*Plumbaginaceae*	1	BL	no data
Limonium malacitanum	*Plumbaginaceae*	7	B	E
Limonium paui	*Plumbaginaceae*	1	V	no data
Limonium pseudoarticulatum	*Plumbaginaceae*	1	BL	no data
Limonium rigualii	*Plumbaginaceae*	3	VC	no data
Linaria orbensis	*Scrophulariaceae*	3	VC	no data
Linaria salzmannii	*Scrophulariaceae*	4	B	nt
Linaria tursica	*Scrophulariaceae*	7	LAG	R
Lithodora nitida	*Boraginaceae*	3	B	E
Marsilea batardae	*Marsileaceae*	5	EX, VC	I
Moehringia fontqueri	Caryophyllaceae	2	B	V
Murbeckiella sousae	*Cruciferae*	10	BD, BE	E
Narcissus nevadensis	*Amaryllidaceae*	5	B	E
Narcissus tortifolius	*Amaryllidaceae*	3	MA	R
Naufraga balearica	*Umbelliferae*	2	BL	E
Nepeta boissieri	*Labiatae*	3	B	V
Nepeta cantabrica	*Labiatae*	4	CC	no data
Omphalodes kuzinskyanae	*Boraginaceae*	2	IBL	E

Pastinaca lucida	*Umbelliferae*	6	BL	nt
Petrocoptis montsicciana	*Caryophyllaceae*	10	P	R
Petrocoptis pseudoviscosa	*Caryophyllaceae*	3	P	V
Picris willkommi	*Compositae*	1	LAG	V
Pimpinella procumbens	Umbelliferae	3	B	R
Pinguicula nevadensis	*Lentibulariaceae*	7	B	V
Plantago nivalis	*Plantaginaceae*	2	B	R
Ranunculus malessanus	*Ranunculaceae*	5	B	R
Ranunculus weyleri	*Ranunculaceae*	2	BL	E
Salix tarraconensis	*Salicaceae*	7	MC, SI, VC	R
Saxifraga hariotii	*Saxifragaceae*	9	P	no data
Senecio elodes	*Compositae*	2	B	E
Serratula legionensis	*Compositae*	6	BD, CC, MG	R
Seseli intricatum	*Umbelliferae*	1	B	E
Sideritis brevispica	*Labiatae*	6	CV	no data
Sideritis glauca	*Labiatae*	4	VC	R
Sideritis serrata	Labiatae	2	B	R
Sideritis stachydioides	*Labiatae*	4	B	R
Silene cintrana	*Caryophyllaceae*	2	BE	E
Silene diclinis	*Caryophyllaceae*	5	VC	V
Silene hifacensis	*Caryophyllaceae*	8	BL, VC	V
Silene sennenii	*Caryophyllaceae*	1	VC	E
Teucrium charidemi	*Caryophyllaceae*	7	MA	V
Teucrium fragile	*Labiatae*	8	B	nt
Teucrium intricatum	*Labiatae*	8	B	R
Teucrium lepicephalum	*Labiatae*	3	B	V
Teucrium salviastrum	*Labiatae*	10	BD, BE	no data
Teucrium subspinosum	*Labiatae*	6	BL	nt
Teucrium turredanum	Labiatae	7	MA	R
Thymelaea calycina	*Thymelaeaceae*	6	P	nt
Thymelaea granatensis	*Thymelaeaceae*	6	B	R
Thymelaea procumbens	*Thymelaeaceae*	6	BD, SC	R
Thymelaea subrepens	*Thymelaeaceae*	9	SI	nt
Thymus willkommii	*Labiatae*	5	MC	nt
Trisetum glaciale	*Gramineae*	3	B	R
Vella lucentina	*Cruciferae*	1	MA	no data
Vicia bifoliolata	*Leguminosae*	3	BL	E
Viola jaubertiana	*Violaceae*	6	BL	R
Xatardia scabra	*Umbelliferae*	9	P	R

* Number of 10×10 UTM grid squares in which the species occurs. ** Natural regions in which the species occurs. *** IUCN category.

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