D. Romero, M. Perille, M. Pimentel, E. Sahuquillo

Botanical interest of mountain peatlands from NW Iberian Peninsula: implications for their conservation

Abstract

Romero, D., Perille M., Pimentel M. & Sahuquillo E.: Botanical interest of mountain peatlands from NW Iberian Peninsula: implications for their conservation. — Bocconea 19: 201-208. 2006. — ISSN 1120-4060.

The botanical interest of peatlands from Xistral and Ancares Mountains (NW Iberian Peninsula) is analysed to assess the importance of their conservation. These peatlands are old ecosystems whose origin goes back to the time of complete melting away of the ice in the last glaciation. Since then, they have served as genetic reservoir for many species. As a consequence, these ecosystems present numerous endemic and relict taxa with restricted distribution in the Iberian Peninsula. The environmental importance of these ecosystems and their floristic particularities support the need to establish management plans to assure their conservation.

Introduction

Peatlands are ecosystems of great environmental importance owing to their influence on hydrological control and water-quality improvement. Also, they support high levels of biological diversity. Bryophytes are responsible for the development of these ecosystems where they shape deep deposits of dead vegetal matter due to the imbalance between accumulation and decomposition-mineralisation rate of the organic matter (Pontevedra Pombal & al. 1996; Moore 1989).

Edaphic and climatic parameters (edaphic humidity and cold temperatures) are the most important factors in the formation and evolution of these ecosystems (Moore 1989). However, these environmental conditions are present in restricted areas in the Iberian Peninsula, mostly in the north (Fernández Prieto & al. 1987). In Xistral and Ancares Mountains (NW Iberian Peninsula) there are many small peat deposits scattered throughout this geographical area. They are exceptional material that can be used to study the origin and evolution of these natural communities (Pontevedra Pombal & al. 1996).

The geographical situation of these peatlands makes their study interesting since they are found at the southern limit of the optimum peatland plant communities (Fig. 1). Their floristic peculiarities derive from their old age (approximately 10,000 years old) and their behaviour as genetic reservoir of specialised fauna and flora presenting, nowadays, many

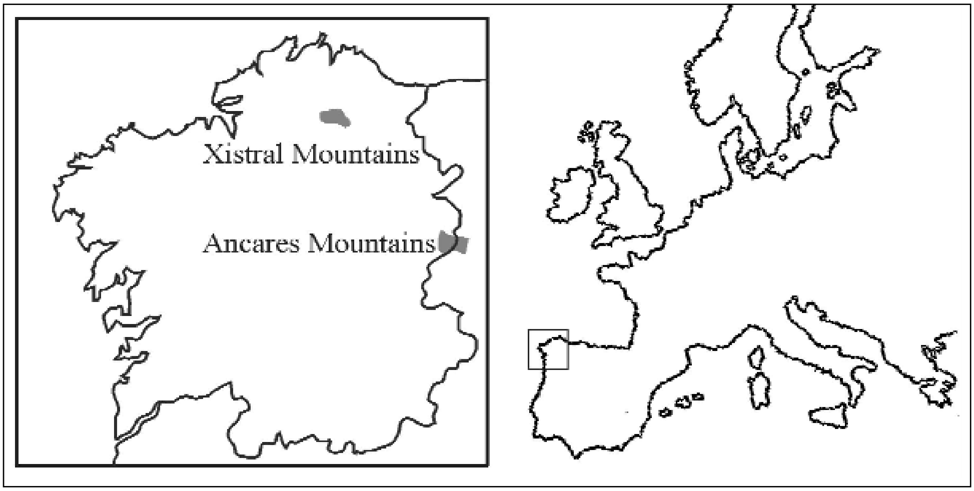

Fig. 1. Geographical localisation of Ancares and Xistral Mountains.

endemic and relict species. Their environmental particularities also result from the equilibrium reached between their behaviour and the traditional use of their natural resources (Rodríguez-Oubiña 1986).

At present, peatlands and their own characteristic species are being object of a particular nature conservation policy at international level. The 92/43/CEE Directive of the European Community Council, relative to the conservation of natural habitats and wild fauna and flora, considers peatlands and natural communities close to these, as ecosystems of Community interest, for which it is of high priority to designate areas for their conservation.

In the mountain systems studied the plant communities that cover nearly all the tops and slopes should be considered "priority natural habitats" for conservation (Table 1). The main disturbances that can be observed in these ecosystems are: drainage to obtain grasslands, pine reforestation, fires, and recently, road building for the installation of windfarms which permits access of exotic species (Rodríguez-Oubiña 1986).

As a result, the study of these ecosystems is a priority due to their environmental importance and to elaborate integral plans for their management to allow their use and conservation.

Material and Methods

The peatlands analysed were selected by their geographical localisation (Fig. 1), geomorphological characteristics and their altitude (Table 2). To establish the plant community composition in peatlands and their influence areas, a floristic inventory of species found in the field was carried out every spring and summer, 2000-03. For each species a coefficient of abundance, dominance and sociability according to Braun-Blanquet (1979) was assigned. Furthermore, observed impacts were evaluated and categorised. The chorologi-

Table 1. Biogeography, bioclimatic belt and syntaxonomy of wetland plant communities present in Xistral and Ancares Mountains (Ramil Rego & al. 1994; Silva Pando 1994). Priority associations and plant communities of European Community interest according to the 92/43/CEE Directive are in bold and normal case, respectively.

	XISTRAL MOUNTAINS	**ANCARES MOUNTAINS**
Chorology	Eurosiberian Region	
	Cantabroatlantic Province	Orocantabrian Province
	Galaico-Asturian Sector	Laciano-Ancarensian Sector
	North Galaico-Asturian Subsector	Naviano-Ancarensian Subsector
Bioclimatic Belt/subbelt	Uppercolline	Subalpine- Montane
Class	**Associations**	**Associations**
Isoeto-Littorelletea	+ *Apio inundati – Isoetetum longissimi* + *Eleocharitetum multicaulis* subass. *eleocharitetosum multicaulis* subass. *hypericetosum elodis* + *Hyperico -Potamogetum oblongi* subass. *potamogetonetosum oblongi*	+ *Hyperico -Potamogetum oblongi* subass. *potamogetonetosum oblongi*
Oxicocco-Sphagnetea	+ **Community of *Sphagnum pylaesii*** + **Community of *Eriophorum angustifolium*** + ***Erico mackaianae – Sphagnetum compacti*** + ***Erico mackaianae – Sphagnetum papillosi***	+ **Community of *Sphagnum recurvum*** + ***Sphagno recurvi – Caricetum ibericae*** (Subalpine, uppermontane) + ***Carici carpetanae – Sphagnetum recurvi*** + ***Sphagno recurvi – Caricetum ibericae*** (Subalpine, uppermontane) + ***Calluno vulgaris – Sphagnetum capillifolii*** (Subalpine, uppermontane, montane) + ***Sphagno rusowii – Scirpetum germanici***
Scheuchzero-Caricetea Fuscae	+ ***Arnicetum atlantiacae*** + ***Rynchosporetum albae*** + ***Sphagnetum pylaesii*** + **Community of *Lycopodiella inundata***	+ ***Erico tetralicis – Trichophoretum germani*** (Subalpine, uppermontane) + ***Arnicetum atlanticae*** (montane) + *Luzulo carpetanae – Juncetum squarrosi* (uppermontane) + *Caricetum rostratae* (uppermontane)
Nardetea strictae	+ ***Serratulo tinctoriae – Nardetum***	+ ***Serratulo tinctoriae – Nardetum strictae*** (uppermontane, montane)
Calluno – Ulicetea	+ ***Ulici galli – Ericetum mackaianae*** + ***Genisto berberideae – Ericetum mackainae*** + ***Carici binervis – Ericetum ciliaris*** + ***Gentiano pneumonanthe – Ericetum mackaianae*** **subass. *ericetosum mackaianae*** **subass. *ericetum vagantis*** + ***Cirsio filipenduli – Ericetum ciliaris*** + ***Ulici galli – Genistetum anglicae***	+ ***Pterosparto tridentati – Ericetum aragonensis*** **subass. *hypericetosum burseri*** (uppermontane) **subass. *agrostietosum curtisii*** (uppermontane) + ***Genisto anglicae – Ericetum tetralicis*** (uppermontane, montane) + ***Daboecio cantabricae – Ulicetum gallii*** **subass. *ericetosum tetralicis*** (uppermontane)

Table 2. Characteristics of the studied peatlands (Pontevedra Pombal 1996).

STUDIED PEATLAND	MOUNTAIN SYSTEM	GEOMORPHOLOGICAL CHARACTERISTICS	ALTITUDE
Braña de Suarbol	ANCARES	Glacial valley bottom	1080 m
Mustallar		Intramorainic	1460 m
Braña de Porto Ancares		Glacial shoulder	1580 m
Campa de Brego		Glacial overexcavation	1370 m
Campa da Cespedosa		Coluvio-alluvial or Histic-coluvio-alluvial	1295 m
Eume	XISTRAL	Glacial valley bottom	725 m
Pena Vella		Weathering basin	746 m

cal, floristic and biological (life-form) spectra were calculated with the data obtained and compared to detect differences among peatland composition and behaviour.

Results and Discussion

One hundred and sixty vascular plants and 60 bryophytes (48 mosses and 12 liverworts) were identified. Among these 24 taxa were endemic, 1 was considered vulnerable, 13 were rare species and 15 were protected by the 92/43/CEE Directive (Table 3). Moreover, 32 plant associations were found (Table 1), of which 25 are considered as priority plant communities for conservation, following the same Directive (Domínguez Lozano & al. 1996; Ortiz & al. 1998; Sérgio & al. 1994).

According to the chorological data, Ancares Mountains have a higher rate of endemisms (17.6% in Ancares and 9% in Xistral) and Eurosiberian elements (19.2% in Ancares and 12.4% in Xistral) than Xistral Mountains, although in the latter the percentage of Atlantic and Mediterranean elements was the highest (Table 3, Fig. 2). These results are a consequence of their altitudinal differences and their geographical situation; Xistral Mountains are near the Cantabrian coast while Ancares range, more continental, are situated in the Cantabrian Mountain ridges (Fig. 1).

In both geographical areas the proportion of endemic species was above 7.6%, half of the percentage of endemic flora calculated for NW Iberian Peninsula according to Jato

Table 3. Relation of the endemic, rare or threatened species present in the studied peatlands according to Domínguez Lozano & al. 1996; Ortiz & al. 1998 and Sérgio & al. 1994. Abbreviations of threat and protection categories: V= Vulnerable; R= Rare; N= Not threatened; AII= Included in Appendix II of the 92/43/CEE Directive; AV= Included in Appendix V of the 92/43/CEE Directive.

IBERIAN ENDEMISMS

- *Spergularia capillacea* (Kindb.) Willk. & Lange
- *Hypericum richeri* subsp. *burseri* (C.D.) Nyman
- *Sedum arenarium* Brot.

R *Saxifraga clusii* subsp. *lepismigena* (Planellas) D. A. Webb

- *Genista florida* subsp. *polygaliphylla* (Brot.) Coutinho
- *Genista micrantha* Gómez Ortega

R *Thymelaea coridifolia* subsp. *dendrobryum* (Rothm.) Laínz

- *Eryngium duriaei* Gay ex Boiss.
- *Galium broterianum* Boiss. et Reut.
- *Leontodon pyrenaicus* subsp. *cantabricus* (Widder) Laínz
- *Luzula lactea* (Link) E.H.F. Meyer
- *Luzula sylvatica* subsp. *henriquesii* (Degen) P. Silva

R *Carex durieui* Steud. ex Kunze

- *Carex elata* subsp. *reuteriana* (Boiss.) Luceño & Aedo
- *Deschampsia flexuosa* (L.) Trin.

AII *Narcissus asturiensis* (Jordan) Pugsley
AII *Narcissus pseudonarcissus* subsp. *nobilis* (Haw.) A. Fernándes

IBERIAN-ATLANTIC ENDEMISMS

- *Ranunculus ololeucus* Lloyd
- *Pedicularis sylvatica* L.
- *Centaurea nigra* subsp. *nigra* (Brot.) Coutinho
- *Agrostis hesperica* Romero & Morales
- *Agrostis truncatula* subsp. *commista* S. Castroviejo & A. Charpin

REGIONAL ENDEMISMS

- *Euphorbia polygalifolia* subsp. *hirta* (Lge.) M. Lainz
- *Angelica major* Lag.

RARE OR THREATENED FLORA

N *Drosera intermedia* Hayne
N *Drosera rotundifolia* L.
N *Sorbus aucuparia* L.
N *Pinguicula lusitanica* L.
N *Pinguicula vulgaris* L.
R *Erica mackaiana* Bab.
R *Saxifraga clusii* subsp. *lepismigena* (Planellas) D. A. Webb
R *Thymelaea coridifolia* subsp. *dendrobryum* (Rothm.) Laínz
R AV *Arnica montana* L.
R *Carex durieui* Steud. ex Kunze

BRYOPHYTES IN THE RED LIST

N *Campylopus atrovirens* De Not.
N *Drepanocladus fluitans* (Hedw.) Warnst.
N *Hylocomium splendens* (Hedw.) Br. Eur.
N AV *Sphagnum flexuosum* Dozy & Molk.
N AV *Sphagnum nemoreum* Scop.
N AV *Sphagnum papillosum* Lindb.
N AV *Sphagnum rusowii* Warnst.
R *Odontochisma sphagni* (Dicks.) Dum.
R *Scapania paludosa* (K. Müll.) K. Müll.
R *Chiloscyphus pallescens* (Ehrh. & Hoffm.) Dum.
V *Cephalozia connivens* (Dicks.) Lindb.
R AV *Sphagnum cuspidatum* Hoffm.

PROTECTED CRYPTOGAMS

AII *Sphagnum pylaesii* Brid.
R AV *Sphagnum cuspidatum* Hoffm.
AV *Sphagnum denticulatum* Brid.
AV *Sphagnum fallax* (Klinggr) Klinggr.
N AV *Sphagnum flexuosum* Dozy & Molk.
N AV *Sphagnum nemoreum* Scop.
N AV *Sphagnum papillosum* Lindb.
AV *Sphagnum subnitens* Warust
N AV *Sphagnum rusowii* Warnst.
AV *Sphagnum subsecundum* Nees
AV *Sphagnum tenellum* (Brid.) Perss.ex Brid.
AV *Cladonia* L.

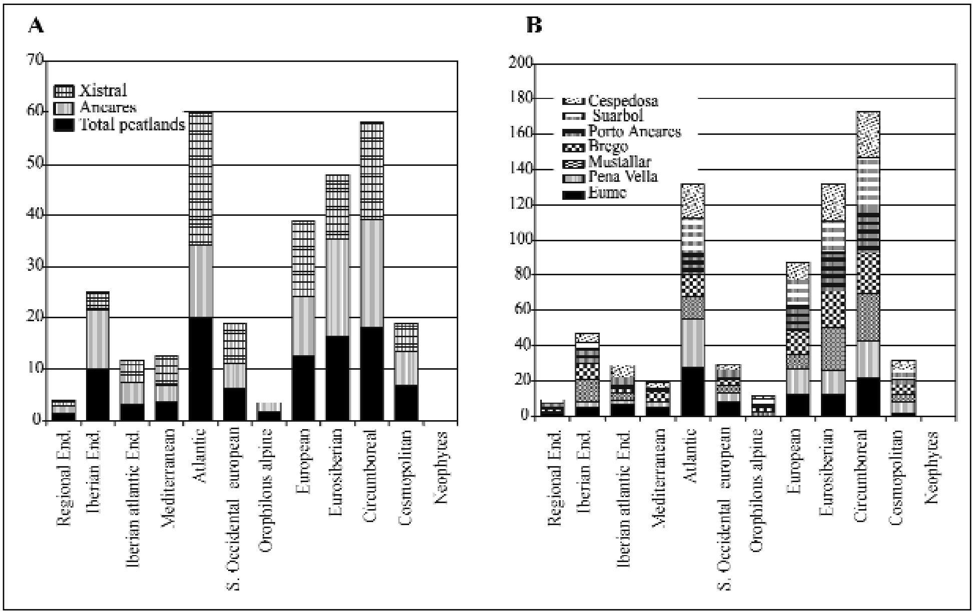

Fig. 2 Comparative chorological spectra. **A:** Differences between mountain systems for all peatlands; **B:** Differences among the analysed peatlands.

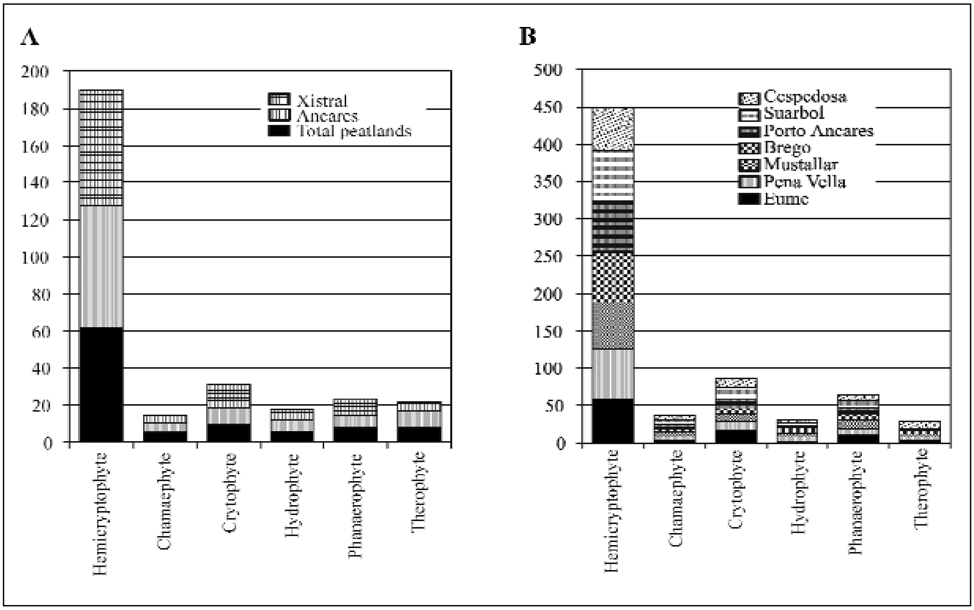

Fig. 3 Comparative biological spectra. **A:** Differences between mountain systems for all peatlands; **B:** Differences among the analysed peatlands.

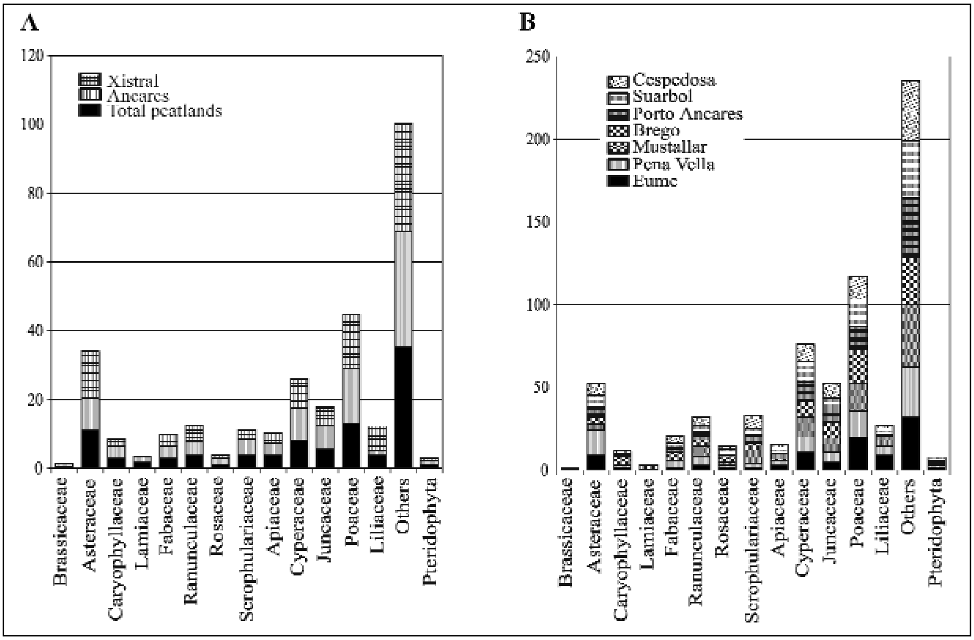

Fig. 4. Comparative floristic spectra. **A:** Differences between mountain systems for all peatlands; **B:** Differences among the analysed peatlands.

Rodríguez & Rodríguez Gracia (1986), showing the ecological importance of these ecosystems. Among the analysed peatlands those situated at highest altitudes (Campa de Extremeños, Mustallar and Porto Ancares) presented the greatest proportion of endemic taxa (Fig. 2B).

To obtain biological spectra only the vascular flora was considered, and in general, the differences observed among the peatlands analysed were slight. In all plant communities there was an obvious dominance of hemicryptophytes, followed by cryptophytes and phanerophytes (Fig. 3). This result agrees with that expected for these ecosystems owing to their edaphoclimatic characteristics (Braun Blanquet 1979).

At floristic level, Ancares peatlands presented the greatest diversity of plant families (Fig. 4). Some floristic differences were: *Scrophulariaceae* was more abundant in Ancares peatlands and *Compositae* and *Liliaceae* in Xistral. The comparison of the floristic spectra from these ecosystems, independently of their geographic origin, points out that the highest diversity in *Poaceae* was in the peatlands that were more affected by stockbreeding exploitation (Campa de Brego from Ancares and Eume peatland from Xistral).

Ecological implications

In all the peatlands studied their development and conservation were affected directly (drainage channels, fires, weeding, trails or windfarms) or indirectly (stockbreeding use) by human activities. The floristic richness and plant species rareness (understood as presence of endemic or threatened species) were always most remarkable in isolated and less accessible peatlands, far from human influence.

Ancares and Xistral Mountains have recently been included in the Nature 2000 Network, sponsored by the 92/43/CEE Directive, which describes areas of interest for which conservation is a priority and determines the need to develop management plans that involve the preservation and restoration of the most altered peatlands. To elaborate these plans, it is necessary to know their specialised flora and their habitat requirements. This information will allow us to assess their level of conservation and to control their evolution, selecting those species which would be useful as biological indicators.

References

Braun Blanquet, J. 1979: Fitosociología. Bases para el estudio de las comunidades vegetales. – Madrid

Domínguez Lozano, F. D., Galicia Herbada, L., Moreno Rivero, J. C., Moreno Saiz, & Sainz Ollero, H. 1996: Threatened plants in Peninsular and Balearic Spain:A report based on the EU Habitats directive. – Biol. Conservation **76:** 123-133.

Fernández Prieto, J. A., Fernández Ordóñez, M. C. & Collado Prieto, M. A. 1987: Datos sobre la vegetación de las “turberas de esfagnos” galaico-asturianas y orocantábricas. – Lazaroa **7:** 443-471.

Jato Rodríguez, V. & Rodríguez Gracia, V. 1986: Introducción ao estudio da flora e á vexetación de Galicia. O Meio Natural Galego. – Cad. Seminario Sargadelos **47:** 109-153.

Moore, P. D. 1989: The ecology of peat-forming processes: a review. – Int. J. Coal Geol. **12:** 89-103.

Ortiz, S., Rodríguez-Oubiña, J. & Pulgar, I. 1998: Unha primeira aproximación ao listado da flora rara e ameazada de Galicia (NO da Península Ibérica). – Nova Acta Ci. Compostelana (Bioloxía) **8:** 95-101.

Pontevedra Pombal, X., Martínez Cortizas, A. & García-Rodeja Gayoso, E. 1996: Caracterización físico-química de depósitos orgánicos en la Serra dos Ancares (NW ibérico): origen y evolución. – Pp. 91-119 in: Pérez Alberti, A. & Martínez Cortizas, A. (eds.), Avances de la reconstrucción paleoambiental de las áreas de montaña lucenses. Monografías G. E. P. 1. – Lugo.

Ramil Rego, P., Rodríguez Gautián, M. & Rodríguez-Oubiña, J. 1994: Flora y Vegetation. – Pp. 61-96 in: Museo de Prehistoria e Arqueoloxía del Villalba, Grupo de Etudios Paleoambientales (eds.), Valoración del patrimonio natural e histórico de las sierras septentrionales de Galicia. – Santiago de Compostela.

Rodríguez-Oubiña, J. 1986: Estudio Fitosociológico de las brañas de la provincia de A Coruña. Tesis doctoral. Universidad de Santiago de Compostela. – Santiago de Compostela.

Sérgio, C., Casas, C., Brugués, M., Cros, R. M. 1994: Lista vermelha dos Briófitos da Península Ibérica. – Lisboa.

Silva Pando, F. J. 1994: Flora y series de vegetación de la Sierra de Ancares. – Fontqueria **40:** 233-388.

Address of the authors:
Romero David; Perille Marcos; Pimentel Manuel & Sahuquillo Elvira,
Dpto. Biol. Animal, Biol. Vegetal y Ecología. Fac. Ciencias. Univ. A Coruña. Campus A Zapateira s/n. 15071 A Coruña. Spain. E-Mail: elvira@udc.es.