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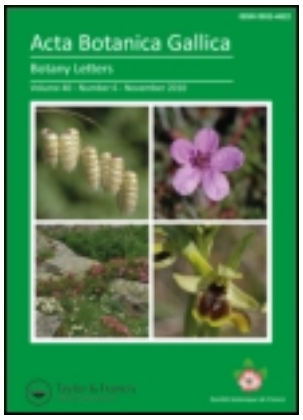

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A new *Erica lusitanica* Rudolphi heathland association to the Iberian south-west

Une nouvelle association aux landes *d'Erica lusitanica* Rudolphi pour le sud-ouest Ibérique

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Abstract: As result of several field trips following doctoral research in Marianic-Monchiquensean Sector, we describe a new heathland named *Lavandulo viridis-Ericetum lusitanici ass nova hoc loco (Genistion micrantho-anglicae*, Rivas-Martínez 1979) as a thermomediterranean to lower mesomediterranean, upper dry to humid, schistose association. The analysis of 11 relevés, following Braun-Blanquet methodology shows the floristic identity of this new association as well as the chorological segregation of its area of occurrence. Finally, despite these communities already being relatively well known and although they are poor in species number, such heathlands show floristic singularity and own sinecology, with a large and distinct geographical area of distribution, so we emphasized its integration within Atlantic wet heaths priority habitat (∗4020 – Annex B-I from Council Directive 92/43/EEC of 21 May 1992).

Keywords: *Erica lusitanica*; heathlands; Iberian southwest; phytosociology; shrub-association

Résumé: À la suite de visites sur le terrain qui ont suivi des recherches en doctorat sur le secteur «Marianico-Monchiquense», nous décrivons une bruyère nommée *Lavandulo viridis-Ericetum lusitanici ass nova hoc loco (Genistion micrantho-anglicae*, Rivas-Martínez 1979) comme une association schisteux thermoméditerranéene a mesomediterranéene inferieur, séche supérieur a humide. L'analyse de 11 relevés, à la suite de la méthodologie de Braun Blanquet montre l'identité floristique de cette nouvelle association, ainsi que la ségrégation chorologique de sa distribution. Enfin, en dépit de ces communautés sont déjà relativement bien connus et bien qu'ils soient pauvres floristique, les bruyères tels montrent la singularité floristique et sinecology propres, avec une grande zone géographique distincte de sa distribution, si nous avons insisté sur son intégration au sein de les Landes humides atlantiques tempérées (habitat 4020∗ - Annexe B-I de la Directive 92/43/CEE du Conseil du 21 mai 1992).

Mots clés: association; bruyères; buissons; *Erica lusitanica*; phytosociologie; Sud-Ouest Ibérique

Introduction

Following the fieldwork undertaken for a doctoral thesis on the vegetation of the Monchique mountains in southern Portugal and scientific exchanges between Évora University and Jaén University, an edaphohygrophilous heathland was recognized, dominated by *Erica lusitanica* and *Ulex minor* var. *lusitanicus*.

Such formations acquire regional importance because *Erica lusitanica* is an exclusive taxon to the occidental regions of the Iberian Peninsula and barely reaching France Castroviejo et al. (1986-2010). Despite it being typically silicicolous it also occurs on limestones with high decarbonation, as shown by Pinto-Gomes and Paiva-Ferreira (2005).

These heathlands are a constant presence on pseudogleyed schistose soils, especially in canyons and flatter areas with hydromorphism, particularly in the most oceanic areas of Monchiquense District.

This territory has a rolling topography with gentle slopes interrupted by the Monchique syenitic massif. It is mainly a Palaeozoic substrate warped by tectonic activity. The lithology is dominated by shales, siltstones and greywackes that form the Baixo Alentejo flysch group in the Mira Geological Formation (Granja 1984).

Following Rivas-Martínez et al. (2002). and Monteiro-Henriques (2010), the study area lies in the upper dry

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Table 1. *Lavandulo viridis-Ericetum lusitanici ass. nova hoc loco (Geniston micrantho-anglicae, Ulicetalia minoris*, *Calluno-Ulicetea*).
Tableau 1. *Lavandulo viridis-Ericetum lusitanici ass. nova hoc loco (Geniston micrantho-anglicae, Ulicetalia minoris*, *Calluno-Ulicetea*).

Number	**7**	**9**	**13**	**5**	**1**	**11**	**12**	**18**	**4**	**8**	**14**	**P**
Exposure	SW	NE	SW	NW	**NE**	E	W	N	W	SW	SW	**R**
Area (sq.m)	100	100	200	100	**100**	200	200	80	150	200	150	**E**
Slope (°)	5	5	10	3	**10**	10	10	3	15	15	10	**S**
Cover (%)	100	100	95	100	**100**	95	95	100	100	100	100	**E**
Average height (m)	2	2,5	2	2	**2**	2	2,5	1,5	1,5	2,5	2,5	**N**
Altitude (m)	160	356	350	180	**160**	405	190	180	125	270	220	**Ç**
Ordinal Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**A**
Association and higher units characteristics												**S**
Erica lusitanica	4	4	4	3	**4**	4	3	4	4	5	4	**V**
Lavandula viridis	1	1	+	-	**1**	2	1	-	-	1	1	**IV**
Ulex minor var *lusitanicus*	-	-	-	4	**3**	-	-	3	+	-	-	**II**
Erica scoparia	-	-	+	-	-	1	1	-	-	-	-	**II**
Lavandula x alportelensis	-	-	-	-	-	-	-	+	+	+	+	**II**
Genista triacanthos var. scorpioides	-	-	-	-	-	-	-	1	-	1	+	**I**
Calluna vulgaris	-	-	-	-	-	-	-	-	-	-	+	**I**
Companions												
Scirpoides holoschoenus	1	1	1	2	1	+	+	+	1	+	1	**V**
Rubus ulmifolius	1	1	1	-	2	1	+	2	1	1	1	**V**
Arbutus unedo	-	-	1	-	-	+	1	+	+	+	1	**III**
Oenanthe croccata	-	+	+	-	-	+	+	1	-	+	-	**III**
Festuca ampla	+	1	1	-	+	-	+	-	-	-	-	**III**
Daphne gnidium	+	-	-	+	+	-	-	+	+	+	+	**III**
Dittrichia viscosa subsp. *revoluta*	1	-	-	+	+	-	-	+	+	-	-	**III**
Sanguisorba hybrida	-	-	-	-	+	+	-	-	+	+	-	**III**
Cistus salviifolius	-	-	+	-	+	-	+	-	-	+	+	**III**
Salix salviifolia subsp. *australis*	-	-	+	-	-	+	+	+	+	+	-	**III**
Lonicera periclymenum subsp. *hispanica*	-	-	-	1	-	-	-	2	+	+	-	**II**
Ranunculus bulbosus var. *adscendens*	-	-	-	+	+	-	-	+	+	-	-	**II**
Rosa canina	-	-	+	-	-	-	+	-	-	+	+	**II**
Leontodon tuberosus	+	+	-	-	-	-	-	+	-	-	-	**II**
Phlomis purpurea	-	-	-	+	-	+	+	-	-	-	+	**II**
Rubia peregrina subsp. *longifolia*	-	-	-	-	-	+	+	-	-	+	+	**II**
Cistus populifolius	-	-	+	-	-	+	-	-	-	+	+	**II**
Nerium oleander	-	-	+	-	-	+	-	-	-	+	+	**II**
Agrostis castellana	-	-	+	-	+	-	+	1	-	-	-	**II**
Rosa pouzinii	+	-	+	-	-	+	-	-	-	-	-	**II**
Viburnum tinus	-	-	-	-	-	-	+	-	-	+	+	**II**
Myrtus communis	-	-	-	-	-	-	+	-	-	+	+	**II**
Lonicera implexa	-	-	+	-	-	-	+	-	-	+	-	**II**
Prunella vulgaris	-	-	-	-	+	-	-	-	-	-	-	**I**
Sanguisorba minor	+	-	-	-	-	-	-	-	+	-	-	**I**
Juncus inflexus	+	-	-	-	+	-	-	-	-	-	-	**I**
Pistacia lentiscus	-	-	-	-	-	+	-	-	-	+	-	**I**
Lotus uliginosus	-	-	-	-	-	+	-	+	-	-	-	**I**
Asphodelus aestivus	-	+	-	-	-	+	-	-	-	-	-	**I**
Salix atrocinerea	-	-	-	+	-	-	-	+	-	-	-	**I**
Lythrum salicaria	-	-	-	+	-	-	-	+	-	-	-	**I**
Pteridium aquilinum	-	-	-	-	+	-	-	+	-	-	-	**I**
Holcus lanatus	-	-	-	-	-	-	+	+	-	-	-	**I**
Pyrus bourgaeana	-	-	-	-	-	+	-	+	-	-	-	**I**
Brachypodium phoenicoides	-	-	-	-	-	-	-	+	-	+	-	**I**

Other taxa: *Senecio foliosus* +; *Juncus acutus* +, (1); *Crataegus monogyna* +; (3); *Hypericum perforatum* +; *Pteridium aquilinum* +; *Cynodon dactylon* +; *Carlina corymbosa* +; *Hypericum undullatum* +; *Asparagus aphyllus* +; *Samolus valerandi* +; *Mentha suaveolens* + (5); *Fraxinus angustifolia* +; *Clematis flammula* +; *Cyperus longus* subps. *badius* +; *Tamus communis* + (6); *Ruscus aculeatus* + (7); *Cynara algarbiensis* +; *Erica arborea* +; *Dactylis hispanica* subsp. *lusitanica* +; *Bellis sylvestris* + (8); *Vitis vinifera* subsp. *sylsvestris* +; *Scrophularia canina* + (9).
Locations:1. Monte da Renda; 2. Curvatos; 3. Barranco das Taipas; 4. Ribeiro dos Carapetos; 5. Fonte das Partilhas; 6. Barranco do Vale Formosil; 7. Ribeira dos Carunchos; 8. Vale de Meadas; 9. Casal das corgas bravas; 10. São Barnabé; 11. Ribeira do Centianes.

to humid, upper thermomediterranean to lower mesomediterranean bioclimatic stages.

Fieldwork allowed to substantiate the particular floristic elements of this community, namely compared with *Cisto psilosepali-Ericetum lusitanicae* (Rivas-Martinez, 1979), described for similar substrates but biogeographically distinct (Toledan-Taganean Sector), consisting the unique *Erica lusitanica* association described.

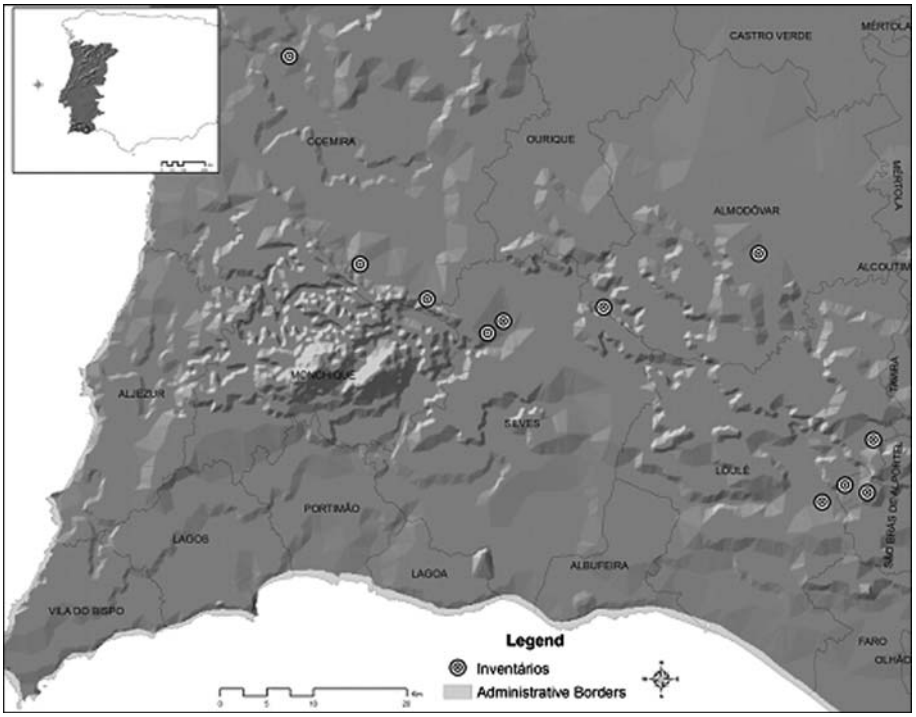

Figure 1. Relevés localization Localisation des relèves réalisées.

Material and methods

Field surveys were conducted from January to March 2010, allowing a floral analysis as the biophysical characterization of these heathlands.

Biogeographical and bioclimatic information followed Rivas Martinez (2005, 2007, 2008). The bioclimatic characterization of these formations was based on the bioclimatic maps developed by Monteiro-Henriques (2010) and was obtained by overlapping of the position of relevés on these maps, which represent the most recent information for the Portuguese mainland.

The taxa identification was made mainly from the following Floras: *Flora iberica* (Castroviejo et al. 1986–2010), *Nova Flora de Portugal* (Franco 1971–1984; Franco and Rocha Afonso 1994–2003), *Flora de Portugal* (Coutinho 1939) and *Flora vascular de Andalucía Occidental* (Valdés et al. 1987). Taxonomical nomenclature followed Rivas-Martínez et al. (2002), Castroviejo et al. (1986–2010 and Coutinho (1939), and sintaxonomical nomenclature followed Rivas-Martínez et al. (2002).

The vegetation analysis, was performed following the phytosociological approach (Braun-Blanquet 1979; Géhu and Rivas-Martínez, 1981).

Results and discussion

As shown in Table 1, (rel. 1 to 11; *typus nominis*: rel. 5) despite the domain of *Calluno-Ulicetea*, characteristic plants there is also evidence the edaphic compensation within this formation, shown by the invariable presence of species such as *Scirpoides holoschoenus*, *Rubus ulmifolius*, *Oenanthe croccata* and elements from mature stages such as *Salix salviifolia* subsp. *australis*, *Salix atrocinerea* and *Vitis vinifera* subsp. *sylsvestris*. These last species demonstrate the catenal and dynamic relationship of this association, whether in riverine forests, representing a regression stage of willow woodlands from *Salicetum atrocinereo-australis*, or in a permanent community. It also occurs in contact with the *Ericion arborae* scrublands that belong to the *Quercetea ilicis* climactic vegetation dynamics, namely *Lavandulo viridis-Querco suberis* sigmetum (Quinto-Canas et al. 2010).

This new association occurs mainly in the southern territories of Marianic-Monchiquensean Sector (Figure 1), in Monchiquense District, with exclusive schistose substrate, under upper dry to humid, upper thermomediterranean to lower mesomediteranean bioclimatic stages and above deep pseudogley soils.

The patrimonial value of this heathland incorporates the Southern Atlantic wet heaths habitat (4020*), from Annex I of Council Directive 92/43/EEC of 21 May 1992. It possesses in its midst species with higher patrimonial value, such as *Lavandula viridis*, *Ulex minor* var. *lusitanicus*, *Salix salviifolia* subsp. *australis* (Annex B-II from Council Directive 92/43/EEC of 21 May 1992) and *Cynara algarbiensis* among others.

Conclusions

The originality of this community and the phytosociological analysis of the 11 relevés carried out in this study, allow us to propose a new Marianic-Monchiquensean association, from schistose soils, especially in canyons

and flattened areas with temporal waterlogging, having as bioclimatic stage the upper thermomediterranean to lower mesomediterran upper dry to humid.

The differentiation of this new association from the work of Rivas-Martinez (1979) with the relatively distinct biogeographical territories (Toledan-Taganean Sector), occurs mainly through the constant presence of *Ulex minor* var. *lusitanicus*, the southwest endemism *Lavandula viridis* and a total absence of *Cistus psilosepalus* and *Erica australis* subsp. *aragonensis*, beside the presence of companion species such as *Cynara algarbiensis* and *Dittrichia viscosa* subsp. *revoluta*, which are exclusively from these southwest territories.

Belonging to Southern Atlantic wet heaths habitat (4020*), from Annex I of the Council Directive 92/43/EEC of 21 May 1992, and essentially consisting of fringes of edaphohygrophilous climactic woodlands, this formation's conservation depends on human action. It therefore becomes important to manage the vegetal land cover favouring its species, namely by clearing thick woodlands and so forcing development of heliophilous stages.

The description of this association in the southwest region of Portugal, suggests the expansion of future and deeper studies of these heathlands to the entire national territory.

Syntaxonomical scheme

The syntaxonomical proposal is in accord with the guidelines of the International Code of Phytosociological Nomenclature (Weber et al. 2000).

Calluno-Ulicetea Br.-Bl. & Tüxen ex Klika & Hadač 1944

* *Ulicetalia minoris Quantin* 1935

- *Genistion micrantho-anglicae* Rivas-Martínez 1979

1. *Cisto psilosepali-Ericetum lusitanicae Ladero ex* Rivas-Martínez 1979

2. ***Lavandulo viridis-Ericetum lusitanici ass. nova hoc loco***

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