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Phytosociologic associations and Natura 2000 habitats of Portuguese coastal sand dunes

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Abstract
The Portuguese coastline is quite long and the littoral ecosystems are of the outmost importance in the context of the national flora and vegetation. The diversity of vegetation types and the endemicity of their flora justify the attention paid to coastal habitats in the implementation of the Natura 2000 network. In this paper we present a synatoxonomical revision of the phanerophytic, chamaephytic and hemicryptophytic communities occurring in the sandy coastal areas of Portugal, together with their correspondence to the "Natura 2000" natural habitat types. The production of synthetic tables with all available relevés has allowed the segregation of plant community types. We also include maps concerning the distribution of all validated vegetation types occurring in the Portuguese sandy coastal areas.

Key words: "Natura 2000" network, Portugal, psamophilous vegetation, sand dunes, syntaxonomy.

Riassunto
La costa portoghese è molto lunga e gli ecosistemi del litorale sono della massima importanza nel contesto della flora e della vegetazione nazionali. La diversità dei tipi di vegetazione e l'endemicità della flora giustifica l'attenzione che viene data agli habitat costieri nell'attuazione della rete Natura 2000. In questo lavoro si presenta una revisione sinatossonomica delle comunità fanerofitiche, camefitiche e emicriptofitiche presenti nelle zone costiere sabbiose del Portogallo, insieme con la loro corrispondenza con i tipi di habitat naturali di "Natura 2000". La produzione di tabelle di sintesi, con tutti i rilievi disponibili, ha consentito la segregazione dei tipi di comunità vegetali. Sono state inoltre allegate cartografie relative alla distribuzione di tutti i tipi di vegetazione convalidati che si rinvengono nel settore costiero sabbioso portoghese.

Parole chiave: dune sabbiose, Portogallo, rete "Natura 2000", sintassonomia, vegetazione psammofila.

Introduction

The flora and the vegetation from coastal areas occur in biotopes associated to severe environmental conditions. Moreover, most psamophilous plants are ecologically specialized and therefore cannot colonise areas without sandy substratum. Due to that specific adaptation, the psamophytic vegetation thrives, in most cases, in significant isolation, like in an island. Environmental isolation in responsible for speciation and thus to the high number of endemics found on the Portuguese coastal dunes. In Continental Portugal the sandy coastal areas south of Tagus River have the highest degree of endemism. The plant communities in these areas, while under typical mediterranean climate are sensitive, fragile, have a high conservation value and deserve strict protection. Many of them are included in protected areas of "Natura 2000" network. Portugal spans through two main macrobioclimatic types. The Temperate in the Northwest, and the Mediterranean in the Northeast, Centre and South. Therefore the Portuguese sand dune communities from the North (atlantic communities), have a different floristic composition when compared with the mediterranean ones. The floristic richness is bigger on the mediterranean communities than on the atlantic ones. Almost all Portuguese psamophilous endemics are found in the Mediterranean communities.

Materials and methods

The purpose of this research was the syntaxonomical study of the Portuguese psamophytic vegetation and the establishment of a correspondence between community types and "Natura 2000" habitat types. All validly published relevés were gathered in synthetic tables and used to distinguish vegetation types from their floristical composition. The distribution range of all the associations was also assessed and plotted in indicative maps.

Finally, considering the high value of this coastal vegetation for conservation purposes, a correspondence was made between plant associations and "Natura 2000" habitat types.

Results

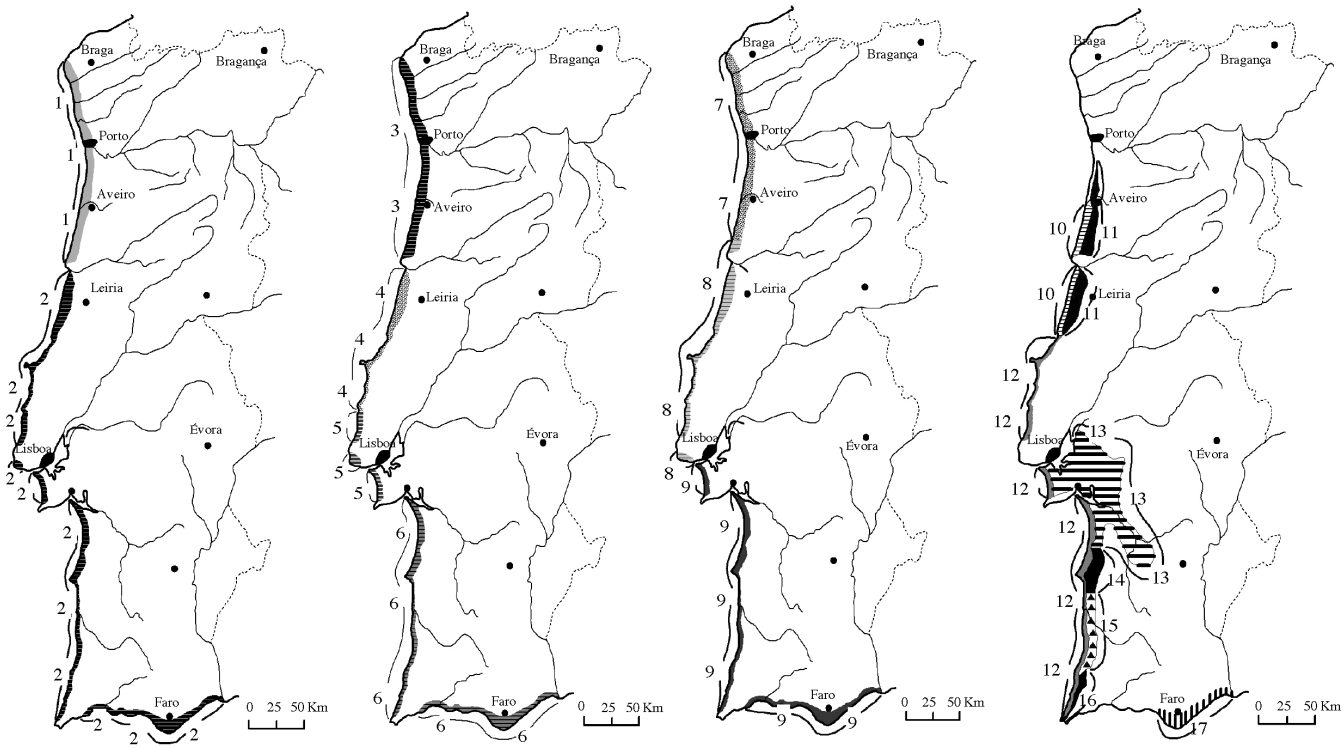
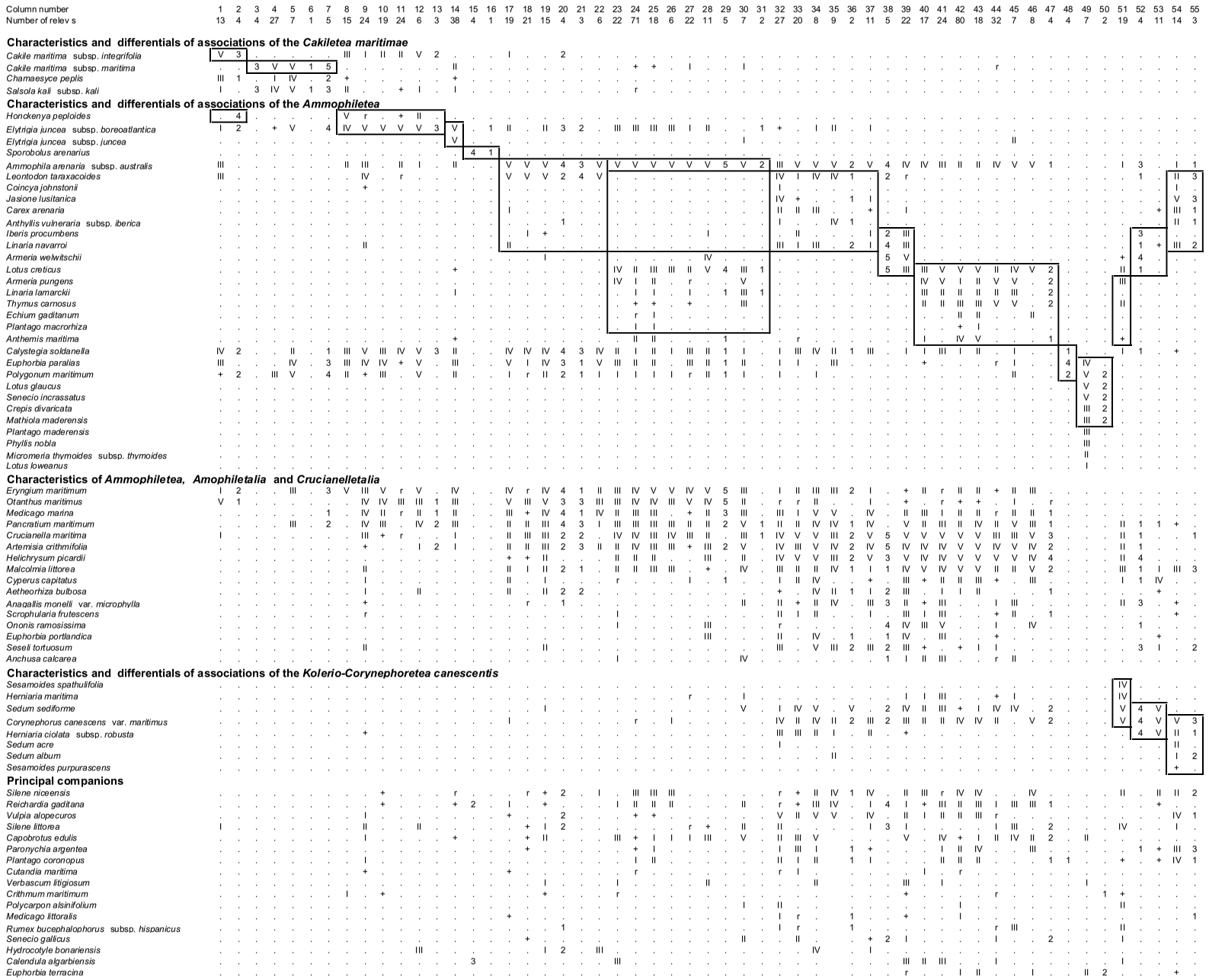


Fig. 1 - Phytosociologic associations and Natura 2000 habitats of Portuguese coastal sand dunes

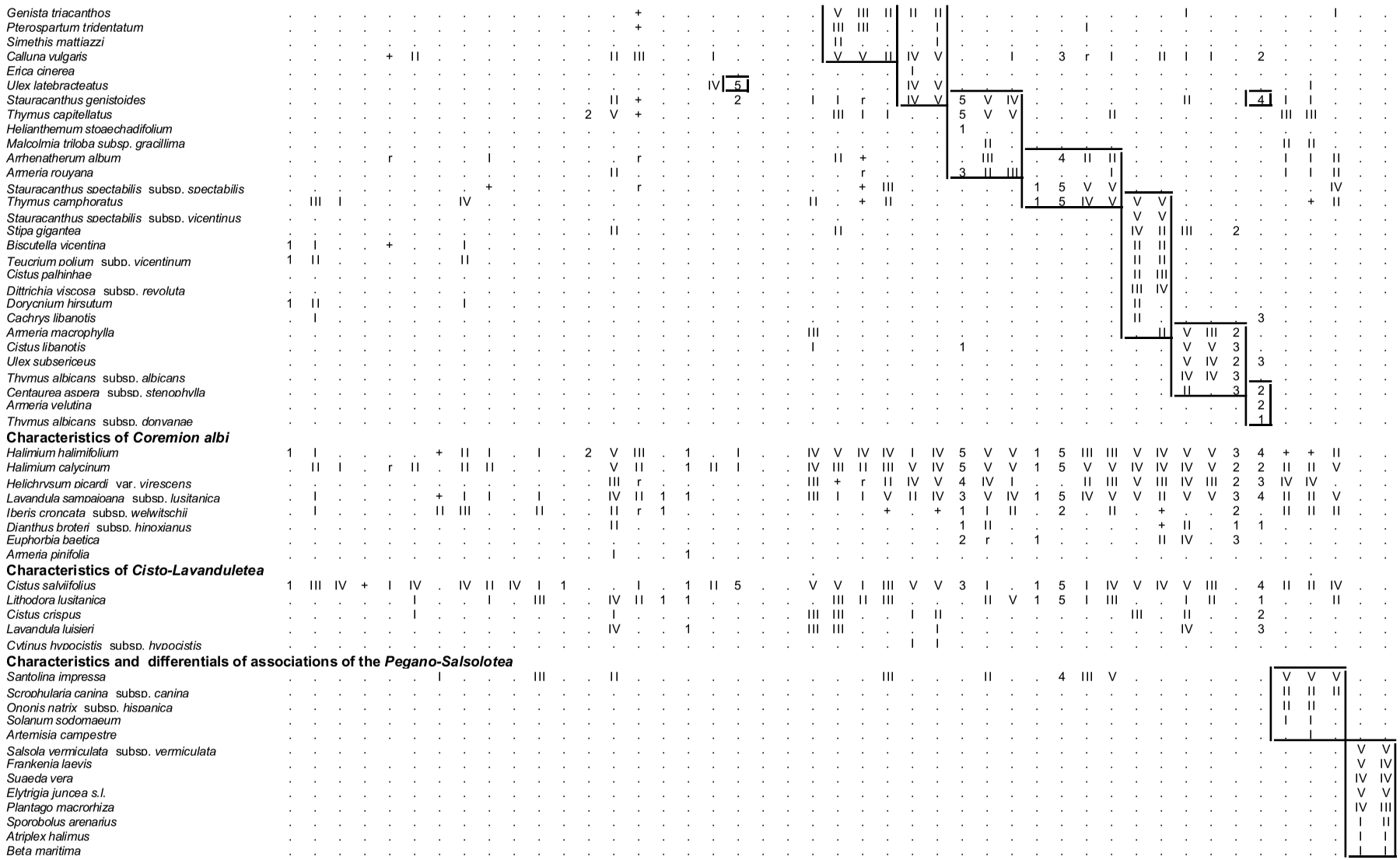
	Associations
1	*Honckenyo-Euphorbietum peplis Tüxen ex Géhu 1964* *Otantho maritimi-Ammophiletum australis* Géhu & Tüxen 1975 corr. Fernández Prieto & T. E. Díaz 1991 *Euphorbio paraliae-Elytrigietum boreoatlanticae* Tüxen in Br.-Bl. & Tüxen 1952 nom. mut.
2	*Salsolo kali-Cakiletum maritimae* Costa & Mansanet 1981 nom. mut. *Loto cretici-Ammophiletum australis* Rivas-Martínez 1965 corr. Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002 *Elytrigietum junceo-boreoatlanticae* J.C. Costa, Neto, Lousã, Capelo & Rivas-Martínez 2005
3	*Jasiono sabulariae-Corynephoretum maritimi* Honrado *et al.* 2007
4	*Herniario robustae-Corynephoretum maritimi* Pinto Gomes, Paiva Ferreira, Cano & S. Mendes 2006
5	*Herniario maritimae-Corynephoretum maritimi* Pinto Gomes, Paiva Ferreira, Cano & S. Mendes 2006
6	*Centaureo sphaerocephalae-Retametum monospermae* Tregublov 1963
7	*Iberidetum procumbentis* Bellot 1996
8	*Armerio welwitschii-Crucianelletum maritimae* J. & G. Br.-Bl., Rozeira & P. Silva 1972
9	*Artemisio crithmifoliae-Armerietum pungentis* Rivas Goday & Rivas-Martínez 1958 *Frankenio laevis-Salsoletum vermiculatae* J.C. Costa in J.C. Costa, Lousã & Espírito-Santo 1997
10	*Rubio longifoliae-Corematum albi* Rivas-Martínez in Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980
11	*Myrico fayo-Arbutetum unedonis* Capelo & Mesquita 1998 *Stauracantho genistoidis-Corematetum albi* Br.-Bl., P. Silva & Rozeira 1964
12	*Rubio longifoliae-Corematum albi* Rivas-Martínez in Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980 *Osyrio quadripartitae-Juniperetum turbinatae* (Rivas-Martínez 1975) Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J C. Costa 1990
13	*Daphno gnidii-Juniperetum navicularis* Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J.C. Costa 1990 *Thymo capitellati-Stauracanthetum genistoidis* (Rothmaler 1954) Rivas-Martínez, T.E. Díaz & F. Fernández-González 1990 *Santolinetum impressae* Rivas-Martínez ex Neto, Capelo, J.C. Costa & Lousã 1997
14	*Daphno gnidii-Juniperetum navicularis* Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J.C. Costa 1990 *Thymo camphorati-Stauracanthetum spectabilis* (Rothmaler 1954) Rivas-Martínez, T.E. Díaz & F. Fernández-González 1990
15	*Daphno gnidii-Juniperetum navicularis* Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J.C. Costa 1990 *Stipo giganteo-Stauracantheum vicentini* (Rothmaler 1954) Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J. C. Costa ex J. C. Costa, Espírito-Santo & Lousã 1994
16	*Stipo giganteo-Stauracanthetum vicentini* (Rothmaler 1954) Rivas-Martínez, Lousã, T. E. Díaz, Fernández-González & J. C. Costa ex J. C. Costa, Espírito-Santo & Lousã 1994
17	*Cistetum bourgaeani* Rothmaler 1954



Tab. 1 - Synthetic table of the therophytic (halo-nitrophilous), chamephytic and hemicryptophytic vegetation of the Portuguese sand dunes: *Honkenio-Euphorbietum peplis* : 1 Neto (1993), 2 Lomba (2004); *Salsolo kali-Cakiletum maritimae* : 3 Costa & Lousa(1992), 4 Costa (1991), 5 Neto (2002), 6 Jardim et al. (2003), 7 Paiva & Pinto Gomes (2005); *Euphorbio paraliae-Elytrigitum boreatlanticae* : 8 Braun-Blanquet et al. (1972), 9 Braun-Blanquet et al. (1972), 10 Costa et al. (2000), 11 Neto (1993), 12 Barreto Caldas et al. (1999), 13 Lomba (2004); *Elytrigietum junceo-boreoatlantici* : 13 Costa et al. (2005); *Sporoboletum arenariae* : 14 Rothmaler (1943), 15 Costa et al. (2005); *Otantho-Ammophiletum* : 17 Braun-Blanquet et al. (1972), 18 Neto (1993), 19 Costa et al. (2000), 20 Barreto Caldas et al. (1999), 21 Lomba (2004), 22 Diez Garretas (1984); *Loto cretici-Ammophiletum australis* : 23 Costa et al (1994), 24 Costa (1991), 25 Costa et al. (1996), 26 Costa & Lousa (1992), 27 Neto (2002), 28 Costa et al. (2000), 29 Diez Garretas (1984), 30 Paiva & Pinto Gomes (2005), 31 Rivas-Martinez et al. (1990); *Iberidetum procumbentis* : 32 Braun-Blanquet et al. (1972), 33 Neto (1993), 34 Costa et al. (2000), 35 Barreto Caldas et al. (1999), 36 Lomba (2004), 37 Honrado et al. (2007); *Armerio welwitschii-Crucianelletum maritimae* : 38 Braun-Blanquet et al. (1972), 39 Costa et al. (2000); *Artemisio crithmifoliae-Armerietum pungentis* : 40 Diez Garretas (1984), 41 Costa et al (1994), 42 Costa (1991), 43 Costa et al. (1996), 44 Neto (2002), 45 Paiva & Pinto Gomes (2005), 46 Costa & Lousa (1992), 47 Rivas-Mart nez et al. (1990); *Polygono maritimi-Euphorbietum paraliae* : 48 Jardim et al. (2003); *Euphorbio paraliae-Lotetum glauci* : 49 Jardim et al. (2003), 50 Costa et al (2004a); *Herniario maritimae-Corynephetum maritimi* : 51 Pinto Gomes et al. 2006; *Hemiario robustae-Corynephoretum maritimae* : 52 Pinto Gomes et al. 2006, 53 Honrado et al.(2007), *Jasione-Corynepheretum maritimae* : 54 Lomba et al.(ined), 55 Lomba (2004).

Tab. 2 - Synthetic table of the nanophanerophytic and microphanerophytic vegetation of the Portuguese sand dunes

	1 5	2 17	3 10	4 15	5 26	6 16	7 10	8 14	9 16	10 13	11 7	12 1	13 2	14 11	15 28	16 2	17 1	18 6	19 5	20 10	21 7	22 10	23 12	24 27	25 11	26 9	27 16	28 5	29 29	30	31 1	32 5	33 29	34 11	35 8	36 12	37 16	38	39 3	40 4	41 17	42 18	43 8	44 18	45 34
Characteristics and differentials of associations of the *Juniperion turbinatae*																																													
Juniperus turbinata subsp. *turbinata*	5	V	V	V	V	V	V			I				I												III	I								+									
Antirrhinum linkianum subsp. *cirrhigerum*	3	V	III	II	II	III	IV	V	IV	V	IV	1														I								II										
Corema album	2	IV	II	.	I	II	IV	V	V	V	V	1	.	IV	II	1	1	V	3	.	I	.	II	III	.	V	V	1	II	V	1	4	II	II	V	IV	.	.	.	1	I	I	.	.	.
Juniperus navicularis	.	.	.	.	.	.	.	.	.	.	.	.	2	V	V	2	1	.	.	.	.	.	II	III	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Characteristics and differentials of association *Myrico fayo-Arbutetum unedonis*																																												
Arbutus unedo	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	V	1	.	.	.	II	+	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrica faya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Erica arborea	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	V	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viburnum tinus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hedera maderensis subsp. *iberica*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ruscus aculeatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Laurus nobilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	+	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ulmifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Teucrium scorodonia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tamus communis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Characteristics of *Quercetea ilicis*																																												
Daphne gnidium	1	II	.	.	+	IV	II	II	.	II	II	1	1	V	V	2	1	III	2	.	.	.	III	+	II	.	II	2	II	.	.	.	.	.	.	III	III	.	.	2	.	.	II	.	.
Rubia peregrina subsp. *longifolia*	3	I	III	IV	IV	V	IV	III	III	V	III	.	.	+	+	1	.	V	1	.	.	.	.	.	.	III	I	.	.	.	.	r	.	.	.	II	.	.	2	.	.	.	.	.
Asparagus aphyllus	3	III	.	II	I	IV	II	III	II	II	III	.	.	II	.	1	1	.	.	II	.	.	II	.	.	I	I	1	.	.	1	4	II	II	.	I	IV	.	3	3	.	.	.	.	.
Rhamnus oleoides subsp. *oleoides*	3	III	IV	III	II	.	III	IV	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Pistacia lentiscus	3	V	V	IV	IV	III	II	V	.	+	III	.	.	II	I	1	.	II	.	.	.	.	I	.	II	.	+	.	.	.	3	.	.	II	.	III	.	.	1	.	.	.	.	.
Osyris lanceolata	2	II	V	II	II	.	.	II	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.
Phillyrea angustifolia	1	II	IV	II	+	III	.	II	.	.	.	.	.	III	III	.	.	V	1	.	.	.	I	I	.	I	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.
Smilax aspera	1	II	.	.	.	III	.	I	.	+	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Scilla monophyllos	.	.	.	.	.	+	.	.	+	II	.	.	.	II	+	.	.	.	.	.	.	.	.	+	.	I	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I	.	.	.
Quercus coccifera	1	I	I	.	r	+	.	.	.	+	.	.	.	III	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Lonicera implexa subsp. *implexa*	1	I	I	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhamnus alaternus	1	II	.	II	I	II	II	.	.	.	.	.	.	.	.	1	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Olea europaea subsp. *sylvestris*	1	I	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ephedra fragilis	1	I	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arisarum simorrhinum	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asparagus acutifolius	.	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Osyris alba	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrtus communis	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Bupleurum paniculatum	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Euphorbia characias	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anemone palmata	.	.	.	.	.	.	.	.	.	.	.	.	.	II	+	.	.	.	.	.	.	.	I	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anagyris foetida	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quercus faginea subsp. *broteroi*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzula forsteri subsp. *baetica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chaemaerops humilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	III	2	3	.	.	.	.	.	.
Aristolochia baetica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Asparagus albus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Pulicaria odora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quercus lusitanica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Characteristics and differentials of associations of the *Cytisetea scoparia-striati*																																												
Cytisus grandiflorus subsp. *grandiflorus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	V	5	.	.	.	.	.	.	I	I	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cytisus striatus subsp. *striatus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	II	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cytisus multiflorus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Retama monosperma	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	V	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Pycnocomon rutifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	V	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cytisus grandiflorus subsp. *cabezudoi*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	III	2	3	.	.	.	.	.	.
Characteristics and differentials of association of the *Calluno-Ulicetea* and *Coremion albi*																																												
Erica erigena	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thymus villosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ulex australis subsp. *welwitschianus*	.	+	.	.	.	.	.	.	I	.	.	.	.	V	IV	.	.	.	.	.	.	III	V	V	V	.	.	4	V	IV	1	5	III	IV	III	.	.	.	.	.	II	II	V	.	.
Cistus ladanifer	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	+	II	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Erica australis subsp. *australis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	IV	IV	.	.	+	.	.	I	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.
Cistus psilosepalus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	I	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis curtisii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	+	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Erica umbellata	.	.	.	.	.	.	.	.	.	.	.	.	.	I	I	.	.	.	.	.	.	.	V	V	III	I	II	.	.	.	.	.	.	I	.	.	.	I	.	.	.	.	.	.	.
Erica scoparia	.	.	.	.	.	+	.	.	.	.	.	.	.	.	r	.	.	I	.	.	.	.	IV	II	.	II	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tuberaria lignosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	IV	+	.	I	I	.	.	I	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.



Osyrio-Juniperetum turbinatae : 1 Rivas-Mart nez et al. (1990), 2 Costa et al (1994), 3 Costa et al. (1993), 4 Neto & Capelo (1999), 5 Neto (2002), 6 Costa et al. (2000), 7 Paiva & Pinto Gomes (2005); *Rubio longifoliae-Corematetum alb* i: 8 Costa et al (1994), 9 Neto (2002), 10 Costa et al. (2000), 11 Paiva & Pinto Gomes (2005), 12 Neto (1993); *Daphno gnidi-Juniperetum navicularis* : 13 Rivas-Mart nez et al. (1990), 14 Costa et al. (1993), 15 Neto (2002), 16 Paiva & Pinto Gomes (2005), 17 Costa et al (1992); *Myrico fayae-Arbutetum unedonis* : 18 Capelo & Mesquita (1998); *Ulici latebracteaci-Cytisetum striati cytisetosum grandiflori* : 19 Costa eta al. (2004); *Centaureo sphaerocephalae-Retametum monospermae* : 20 Costa et al. (1997), 21 Costa et al. (2004); *Cytisetum cabezudoii* : 22 Costa et al. (2004); *Erico umbellatae-Ulicetum welwitschiani* : 23 Costa et al. (1997a), 24 Neto (2002), 25 Paiva & Pinto Gomes (2005); *Stauracantho genistoidis-Corematetum albi* : 26 Braun-Blanquet et al. (1964), 27 Costa et al (2000); *Thymo capitellatae-Staucanthetum genistoidis* : 28 Rivas-Mart nez et al. (1990), 29 Neto (2002), 30 Rothmaler (1954); *Thymo camphorati-Stauracanthetum spectabilis* : 31 Rivas-Mart nez et al (1990), 32 Costa et al (1992), 33 Neto (2002), 34 Paiva & Pinto Gomes (2005); *Stipo giganteae-Stauracanthetum vicentinae* : 35 Costa et al (1992), 36 Rothmaler (1943); *Cistetum libanotis* : 37 Costa (1991), 38 Rothmaler (1954), 39 Braun-Blanquet et al. (1964); *Halimio halimifoliae-Stauracanthetum genistoidis* : 40 Costa (1991); *Santolinetum impressae* : 41 Costa et al. (1998), 42 Neto (2002), 43 Paiva & Pinto Gomes (2005); *Frankenio laevis-Salsoletum vermiculatae elymietosum boreali-atlantici* : 44 Costa et al. (1998), 45 Costa (1991).

Discussion

The high ecological significance of coastal habitats, the endemicity of their flora, and a large set of vegetation types seem to support the large proportion coastal habitat types in the NATURA 2000 typology at European level. Moreover, also one should note also the fact that 35 % of the total Portuguese habitats correspond to coastal types, due to the country's large stretch of seaside. In the Tab. 1 and 2, 27 NATURA 2000 habitat types are clearly recognized and being 3 of them prioritary. Nevertheless, the wealth of vegetation types is not clearly expressed in terms of NATURA 2000 habitat types, since the later are far too general to encompass all vegetation-types to association level. Nor is the endemic character emphasized since some endemic vegetation types are included into general types of wide European distribution. Far too frequent are oversimplified technical accounts of percent significance of habitats at national or European levels not taking endemicity in account. Thus, this is a dangerous approach – if specific national 'sub'-typologies are not set. Other habitat classifications, such as EUNIS seem, in this perspective, more useful. A national effort by Portuguese phytosociologists, in a frame of a protocol between ALFA (the Portuguese Phytosociology Association) and the Ministry of Environment, established such a specific set of 'sub-habitats' shelled in the NATURA 2000 classification, with both a closer correspondence to vegetation types and also evaluating rarity and endemicity at the national level. The set files with a normalized layout tends now to be the national reference for habitats in Portugal, since it does not conflict at all with NATURA 2000, but on the contrary, sets it in national context and adds detail to it – so that it can be useful for both professional ecologists and technicians.

Files are downloadable in: HTTP://WWW.ICN.PT/PSRN2000/CARACT_HABITAT.HTM

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