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Mentha cervina communities in Portugal

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Abstract: Silva, V., Póvoa, O., Espírito-Santo, M.D., Vasconcelos, T. & Monteiro, A. *Mentha cervina communities in Portugal. Lazaroa 30: 73-79 (2009).*

Mentha cervina is traditionally used in the Alentejo region as a seasoning for fish dishes, as well as for medicinal purposes. The species has been disappearing in the wild, due mainly to excessive collection, overgrazing, and habitat destruction. Fifteen *M. cervina* locations situated in mainland Portugal and Spain (Extremadura) were studied using the phytosociological approach. *M. cervina* is characteristic of the *Menthion cervinae* alliance – tall therophyte plant communities with a long flooding period that lasts until summer. All the relevés correspond to the *Cypero badii-Menthetum cervinae* association.

Keywords: Temporary ponds, Habitat of Community interest, *Menthion cervinae*, Iberian Peninsula.

Resumen: Silva, V., Póvoa, O., Espírito-Santo, M.D., Vasconcelos, T. & Monteiro, A. *Comunidades de Mentha cervina en Portugal. Lazaroa 30: 73-79 (2009).*

La *Mentha cervina* es tradicionalmente utilizada en la región de *O Alentejo* para preparar platos de pescado, así como remedio medicinal. Esta especie está en franca regresión en la naturaleza, debido sobre todo a la intensa recolección, el pastoreo excesivo y la destrucción de hábitat. Se han realizado inventarios fitosociológicos de quince estaciones de *M. cervina* localizadas en territorio portugués y español (Extremadura). Estas pertenecen a la alianza *Menthion cervinae*, que reúne las asociaciones encharcadas por aguas relativamente profundas en primavera y que se secan en verano. Todos los inventarios efectuados tienen se corresponden con la asociación *Cypero badii-Menthetum cervinae*.

Palabras clave: Charcas temporales, Hábitat de Interés Comunitario, *Menthion cervinae*, Peninsula Iberica.

INTRODUCTION

Mentha cervina also known as Hart's Pennyroyal and by its common Portuguese name *'hortelã-da-ribeira'*– is a plant species that is emblematic of Portugal's traditional gastronomy. The ethnobotanical enquiries that we were able to make confirm that the species is mainly used as a seasoning for fish dishes. Chemical analysis showed that pulegone, isomenthone, and limonene were the main components of *M. cervina* essential oils, and this explains their traditional use in cooking as well as for medicinal purposes – particularly for digestive and respiratory problems (Monteiro & *al.*, 2007; Póvoa & *al.*, 2004; Rodrigues & *al.*, 2007).

Over the course of our various periods of fieldwork we found that the species is disappearing in the wild. This was confirmed by surveys in areas that had previously been reported in herbaria as species habitat (Póvoa & *al.*, 2006).

An analysis of the descriptions of natural habitat types of Community interest in the Natura 2000 Network Management Plan for mainland Portugal (ALFA, 2005) showed that *M. cervina* is a plant that is characteristic of the habitat types of Mediterranean temporary ponds (3170) and oligotrophic to mesotrophic standing waters with *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* vegetation (sub-type deep seasonal ponds with *M.*

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cervina – 3130pt5). The unfavourable conservation status of these habitats made it all the more necessary to perform a syntaxonomical analysis of *M. cervina* communities in mainland Portugal.

M. cervina occurs in the western Mediterranean region (VALDÉS, & *al.*, 1987), and constitutes community complexes that fall within the *Menthion cervinae* alliance (RIVAS-MARTÍNEZ & *al.*, 2002). This alliance differs from *Isoetion* in that it is more thermophile and requieres a longer flooded period, albeit not to the same extent as communities of the *Phragmito-Magnocaricetea* class (BRULLO & MINISSALE, 1998; RIVAS GODAY & BORJA CARBONELL, 1961). The optimal distribution of these phytocenoses is to be found in the Mediterranean West Iberian Province, with intermittent occurrence in the Coastal Lusitan-Andalusian and Betic Provinces (PINTO-GOMES & PAIVA-FERREIRA, 2005).

STUDY AREA

The relevés are distributed across the main river basins in the studied area (Figure 1). At the end of 2005 the occurrence of *M. cervina* was registered in sixteen locations, three of which were in Spain. Relevés carried out at the end of spring 2007 revealed that one population had disappeared in the meantime, due to the flooding of the Alqueva Reservoir.

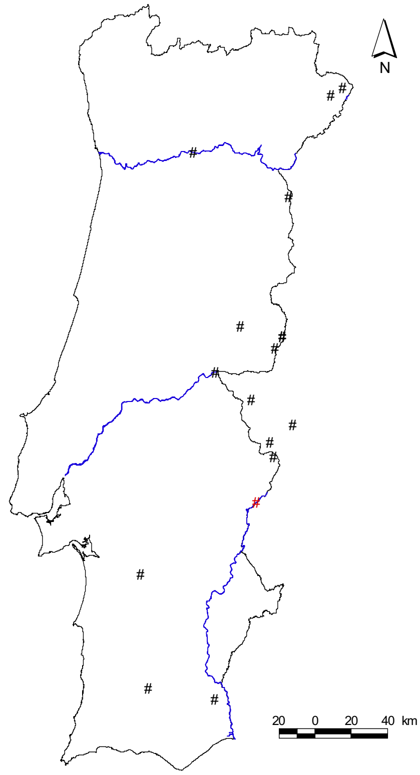

Figure 1.—Location of studied *M. cervina* populations. The red point marks one population that disappeared when the Alqueva Reservoir was flooded (AAl: Elvas, Ponte da Ajuda, 29SPC5893).

MATERIALS AND METHODS

During the spring of 2007 phytosociological relevés were carried out in accordance with GÉHU & RIVAS-MARTÍNEZ (1981) and CAPELO (2003). Data were sampled at the 15 locations where *M. cervina* occurred. Vascular flora identification was based on CASTROVIEJO & *al.* (1986-2005), FRANCO (1984), FRANCO & ROCHA AFONSO (1994-2003), and syntaxa nomenclature on RIVAS-MARTÍNEZ & *al.* (2001, 2002). The relationships between species and environmental variables were studied using a canonical correlation analysis (CCA) that was applied to the relevés with the *Canoco* program, with manual forward selection with Monte Carlo permutation tests (BRAAK & SMILAUER, 2002).

RESULTS

Vascular plant communities with *M. cervina* were sampled in river margins, riversides and reservoirs that were deep-waterlogged until spring and dried in early summer. The sites had the following characteristics:

Clay depressions in rivers and streams with a rocky bed;

Sandy clay depressions in streams with a gravelly bed;

Dam borders with clay soils, which spend much of the year submerged by eutrophic water.

Some *M. cervina* populations were well preserved, with a large number of individuals. However, the majority were fragmented, essentially due to intensive plant harvesting, grazing, eutrophiza-

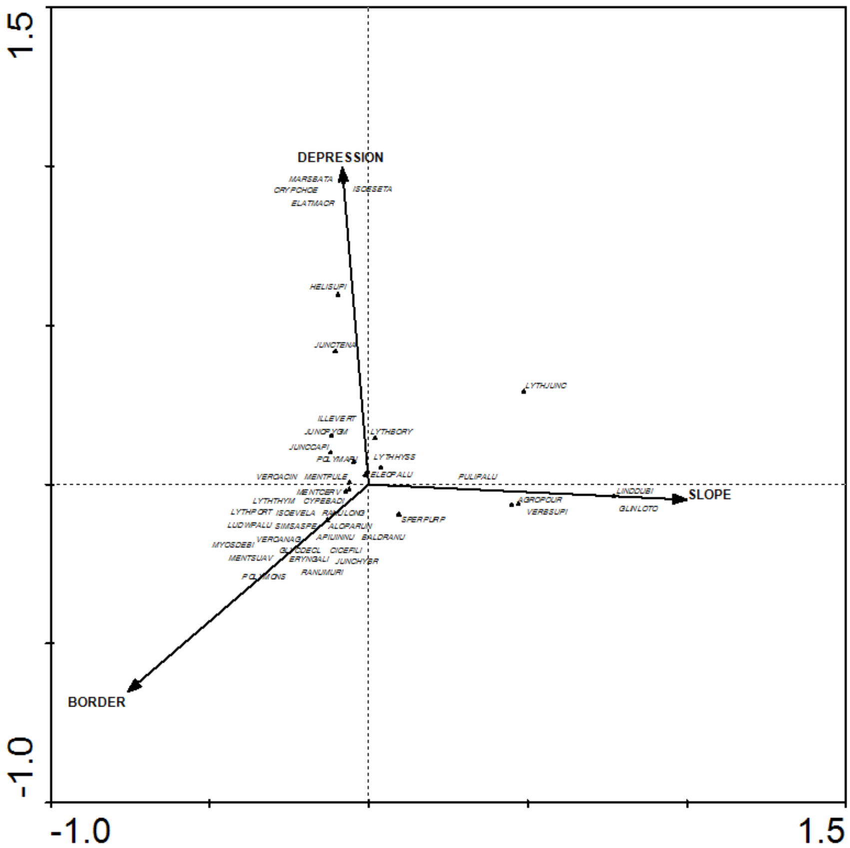

Figure 2.— CCA ordination diagram of the species determined by topography variable (depression, slope and border). Axis 1: eigenvalue = 0.36; Axis 2: eigenvalue = 0.34.

tion, and physiographic changes to the margins, as previously described by Póvoa & *al.* (2006).

The relationship between floristic composition and environmental variables is shown in Figure 2. The following *geopermasigmeta* were determined in accordance with a gradient of humidity and temperature and location characteristics:

Junco pygmaei-Isoetetum velati; *Cypero badii-Menthetum cervinae*; *Pulicario paludosae-Agrostietum pourretii*, in condition 1;

Peplido hispidulae-Isoetetum delilei / community of *Marsilea batardae* in downstream Guadiana borders; *Cypero badii-Menthetum cervinae*; *Pulicario paludosae-Agrostietum pourretii*, in condition 2;

community of *Elatine macropoda; Cypero badii-Menthetum cervinae*; *Pulicario paludosae-Agrostietum pourretii*, in condition 3.

Multivariate analysis did not reveal an expressive separation between the relevés (*Cypero badii-Menthetum cervinae* and catenal contacts), probably because all the surveyed phytocenoses were classified in the *Isoeto-Nanojuncetea* class. Table 1 (next page) summarises the relevés for *M. cervina* communities that were classified in the *Cypero badii-Menthetum cervinae* association.

DISCUSSION AND CONCLUSIONS

M. cervina is a species that is characteristic of *Menthion cervinae*, an *Isoeto-Nanojuncetea* alliance which and comprises spring and early summer bloom associations of small disjointed areas that are deep-flooded in spring and dry in summer

Table 1
Cypero badii-Menthetum cervinae Rivas Goday *in* Rivas Goday *et al.* 1956 *nom. mut.*
(*Menthion cervinae*, *Isoetetalia*, *Isoeto-Nanojuncetea*)

Area (m^2)	1	2	3	2	1	2	2	4	2	2	2	2	1	1	1	1	4	
Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	A
Characteristic species of the association and alliance:																		
Mentha cervina	3	3	4	4	3	3	3	2	4	4	4	4	2	2	1	3	3	V
Cyperus badius	2	3	2	3	1	+	.	+	2	2	2	2	.	2	4	2	2	V
Veronica anagalloides	+	.	.	1	1	.	.	.	.	.	.	.	+	1	1	.	.	II
Sisymbrella aspera	.	+	.	.	+	.	.	.	.	.	+	.	+	.	.	.	.	I
Isoetes velatum	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	1	.	I
Ranunculus longipes	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	I
Isoetes setaceum	.	.	.	.	.	.	+	.	.		.	.	.	.	.	.	.	+
Marsilea batardae	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+
Eryngium galioides	.	+	.	.	.	.	.	.	.		.	.	.	.	.	.	.	+
Characteristic species of the order and class:																		
Pulicaria paludosa	1	+	+	+	1	1	2	1	+	+	.	+	+	.	.	.	+	IV
Mentha pulegium	2	2	1	+	+	.	+	+	.	.	1	+	2	1	.	.	+	IV
Juncus bufonius		1	+		1	.	1	.	.	.	+	+	+	.	.	+	2	III
Lythrum hyssopifolia	+	1	+			.	2	.	.	.	.	.	.	+	+	.	1	III
Lythrum borysthenicum	+				1	.	1	.	.	.	.	.	.	.	.	.	1	II
Juncus pygmaeus	.		1			.	+	.	.	.	.	.	.	.	.	+	1	II
Agrostis pourretii	.		+			.	1	.	.	.	.	.	.	.	.	.	1	I
Lythrum portula	.		.	.	+	.		.	.	.	.	+	+	.	.	.	.	I
Juncus hybridus	.		.	.	+	.	1	.	.	.	.	.	.	.	.	.	.	I
Juncus capitatus	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
Veronica acinifolia	.		.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+
Lythrum thymifolia	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Juncus tenageia	.		.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+
Companion species:																		
Polypogon maritimus	+	+	+	1	1	1	2	.	.	+	.	+	.	.	.	+	1	IV
Oenanthe crocata	.	1	1	2	.	.	.	+	1	.	1	1	+	+	+	.	+	IV
Lythrum salicaria	.	2	.	.	+	.	.	.	2	.	.	.	+	1	1	1	1	III
Rumex conglomeratus	.	.	+	.	+	+	.	.	+	+	+	.	.	.	.	.	+	III
Eleocharis palustris	1	.	1	.	.	.	.	1	1	.	.	.	1	.	.	2	+	II
Myosotis debilis	.	+	1	.	.	.	+	.	.	.	+	.	.	.	+	.	1	II
Coleostephus myconis	+	+	.	.	+	+	.	.	.	.	.	.	.	+	.	.	+	II
Baldellia ranunculoides	.	.	+	.	.	.	.	.	.	.	1	.	2	.	.	2	+	II
Polygonum lapathifolium	1	+	.	.	+	.	.	.	.	.	.	.	.	1	1	.		II
Mentha suaveolens	.	1	.	.	+	.	.	.	.	.	+	.	.	1	.	.	+	II
Apium nodiflorum	.	1	.	.	.	.	.	+	.	.	.	.	.	.	1	.	1	II
Spergularia purpurea	.	1	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	II
Scirpoides holoschoenus	.	.	.	.	.	.	.	1	+	.	+	.	.	.	.	.	+	II
Poa trivialis	+	.	.	.	.	.	.	.	+	.	1	1	.	.	.	.	.	II
Chamaemelum mixtum	.	.	.	.	1	.	+	.	.	.	.	.	.	.	+	.	+	II
Alisma lanceolata	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	I

Other species: *Anchusa undulata, Aster squamatus*, *Bromus hordeaceus*, *Crassula tillaea*, *Galium parisiense*, *Lolium rigidum*, *Meliolotus indicus*, *Misopates orontium*, *Plantago lanceolata*, *Poa annua*, *Polycarpon tetraphyllum, Polygonum equisetiforme*, *Verbena supina* and *Vulpia geniculata* +, *Cerastium glomeratum*, *Lotus castellanus*, *Ranunculus trilobus* and *Silene gallica* 1 in 1; *Anagallis arvensis*, *Callitriche stagnalis*, *Poa annua*, *Polycarpon tetraphyllum*, *Cerastium glomeratum*, *Chamaemelum fuscatum*, *Convolvulus arvensis*, *Lolium temulentum*, *Oxalis pes-caprae*, *Ranunculus saniculifolius*, *Rumex crispus*, *Tolpis barbata* and *Veronica arvensis* +, *Cardamine hirsuta* 1, *Alopecurus arundinaceus* 2 in 2; *Juncus acutiflorus* and *Alopecurus arundinaceus* +, *Gratiola officinalis*, *Ranunculus peltatus* and *Ranunculus saniculifolius* 1 in 3; *Rumex pulcher* ssp. *woodsii* + in 4; *Anchusa undulata*, *Silene gallica*, *Eragrostis pilosa*, *Plantago coronopus*, *Polygonum aviculare*, *Portulaca oleracea*, *Solanum nigrum* and *Xanthium strumarium* +, *Cardamine hirsuta* and *Diplotaxis catholica* 1 in 5; *Lolium rigidum*, *Heliotropium supinum* and *Tolpis barbata* + in 6; *Isoetes histrix*, *Lolium rigidum*, *Corrigiola litoralis*, *Plantago lagopus* and *Polygonum aviculare* + in 7; *Amaranthus graecizens* ssp. *silvestris*, *Atriplex prostrata*, *Bidens aurea*, *Capsella rubella*, *Glinus lotoides*, *Lindernia dubia*, *Portulaca oleracea* and *Sonchus oleraceus* +, *Verbena supina* and *Paspalum paspalodes* 2 in 8; *Festuca ampla* and *Rorippa nasturtium-aquaticum* 1 in 9; *Paspalum paspalodes* + and *Nerium oleander* (*frut.*) 1 in 10; *Glyceria declinata* 1 in 11; *Rorippa nasturtium-aquaticum* +, *Eclipta prostrata*, *Epilobium tetragonium*, *Holcus lanatus* and *Hordeum geniculatum* 1 in 12; *Alopecurus arundinaceus* and *Juncus acutiflorus* +, *Apium inundatum* 1 in 13; *Cerastium glomeratum*, *Ranunculus trilobus* and *Silene gallica* +, *Lotus parviflorus*, *Plantago lanceolata*, *Medicago polymorpha*, *Polypogon monspeliensis*, *Potentilla reptans*, *Bidens frondosa* and *Xanthium strumarium* 1, *Allium schmitzii*, *Festuca duriotagana*, *Lotus corniculatus*, *Aster squamatus*, *Agrostis*

(RIVAS GODAY, 1957). It can form the following associations:

- *Eryngio corniculati-Menthetum cervinae*, is characterized by the presence of *Isoetes velatum* and the absence of any companion of the alliance *Agrostion pourretii*. *M. cervina* is absent most of the time, with occurrence of the sub-association that is typical of cold climates (RIVAS GODAY, 1957, 1964).

- *Preslietum cervinae*, which Braun-Blanquet described for the Mediterranean region of southern France, develops in deep and cold waters that dry in summer. The presence of *Eleocharis palustris* is typical, as shown by the relevés carried out by MOLINIER & TALLON (1948), MOOR (1937), OCAÑA GARCIA (1959), and RIVAS GODAY & *al.* (1956).

- *Cypero badii-Menthetum cervinae*, which differs from *Menthetum cervinae* due to the presence of *Eryngium galioides*, *Marsilea batardae* and *Cyperus badius* (dif.) and the absence of *Eleocharis palustris*, which is unable to resist long submerged periods and running water (RIVAS GODAY, 1964, 1971).

The species *Eryngium corniculatum* was not found in the relevés we carried out as part of the present study (locations with *M. cervina* in mainland Portugal and at some Spanish sites near the border). That is to say that the presence of the *Eryngio corniculati-Menthetum cervinae* association was not verified, although it is mentioned in other studies conducted in the Alentejo (ESPÍRITO-SANTO & ARSÉNIO, 2005) and the Algarve (PINTO-GOMES & PAIVA-FERREIRA, 2005). This association is frequent in southern mainland Portugal, in the centre of Mediterranean temporary ponds (habitat 3170), where *M. cervina* is always absent.

Given the bioclimatic characteristics of this part of the world (COSTA, pers. comm.; COSTA & *al.*, 1998; RIVAS-MARTÍNEZ, 2007), the *Menthetum cervinae* association does not reach mainland Portugal. This means that all the surveyed communities with *M. cervina* should be included in the *Cypero badii-Menthetum cervinae* association (cf. Table 1). The locations where *M. cervina* occurs are not cold enough for *Menthetum cervinae*. In Spain, the study of the La Vera region (upper meso-Mediterranean bioclimate) by AMOR & *al.* (1993) does not consider the occurrence of this association. These authors agree with RIVAS GODAY (1964), who said that the *Menthetum cervinae* association only occurred east of Madrid. However, unlike those need by the ones which RIVAS GODAY (*l.c.*) used to describe the association, many recent relevés mention the presence of *Eleocharis palustris* (*cf.* Table 1). On the other hand, both the latter and *Cyperus badius* are present in RIVAS GODAY'S *Menthetum cervinae* relevés. A large number of characteristic species are common to both associations. These not only include *M. cervina*, but also the taxa *M. pulegium*, *Sisymbrella aspera* and *Veronica anagalloides*. In thermo-Mediterranean conditions, *Marsilea batardae* and *Eryngium galioides* are good taxa for differentiating between *Cypero badii-Menthetum cervinae* and *Menthetum cervinae*, but these species are rare in mainland Portugal and are seldom found in the study area. The relevés carried out in non thermomediterranean conditions seem to be a fragment of the *Cypero badii-Menthetum cervinae* association. When they are well preserved, these communities should be included in habitat sub-type 3130 pt5 – deep seasonal ponds with *M. cervina*.

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castellana 3 in 14; *Bidens frondosa*, *Carum verticillatum* and *Rumex crispus* +, *Ludwigia palustris* 1 in 15; *Illecebrum verticillatum*, *Isolepis pseudosetacea* and *Juncus acutiflorus* +, *Carum verticillatum* and *Gratiola officinalis* 1 in 16; *Ranunculus trilobus*, *Bidens frondosa*, *Campanula lusitanica*, *Carum verticillatum*, *Chaetonychia cymosa*, *Flueggea tinctoria* (*frut.*), *Glyceria declinata*, *Plantago coronopus*, *Polygonum aviculare* and *Spergularia purpurea* +, *Paspalum paspalodes* 1 in 17.

Localities: 1: Alto Alentejo: Nisa, Montalvão (29SPD2491); 2: Cáceres: Valencia de Alcántara, Alburel (29SPD5470); 3: Badajoz: Alburquerque, rio Zapatón (29SPD8852); 4: Badajoz: Alburquerque, rio Xevora (29SPD6939); 5, 6 and 7: Alto Alentejo: Campo Maior, Ouguela (29SPD7227); 8: Alto Alentejo: Alcácer do Sal, Torrão (29SNC6538); 9: Baixo Alentejo: Almodôvar, Gomes Aires (29SNB7252); 10: Baixo Alentejo: Castro Verde, Entradas (29SPB2644); 11: Baixo Alentejo: Figueira de Castelo Rodrigo, Escarigo (29SNB7252); 12: Tras os Montes: Miranda do Douro, Vilar Seco (29TQF1699); 13: Tras os Montes: Miranda do Douro, Póvoa (29TQG2606); 14: Tras os Montes: Peso da Régua, Bagaúste (29TPF0456); 15: Beira: Idanha-a-Nova, Monfortinho (29TPE7918); 16: Beira: Idanha-a-Nova, Salvaterra do Extremo (29TPE7918); 17:Beira: Idanha-a-Nova, Segura (29TPE7209); A:Synthesized table.

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