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Sintaxonomic concerns on *Genista polyanthos* R. Roem. ex Willk. broomlands from Southern Portugal

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Abstract
As result of several field trips following PhD researches in Marianic-Monchiquensean Sector, we describe a new broomland association named *Genistetum triachanthi-polyanthi* as a thermomediterranean, oceanic and sub-humid to humid, schistose association. The 26 relevés analysis, combining phytosociologic methodology with hierarchical cluster analysis (Ward's Hierarchical Clustering, based on Bray-Curtis distance) allowed the segregation of this *Monchiquense* association.
Appearing as a regressive stage, or fringe, of secondary or edaphoxerophilous cork oak and, punctually, holm oak woodlands, it reveals a high sinecological value, in a wide variety of edaphoclimatic typologies, despite its poorest species number, since it includes restrict distribution taxa with high conservational value.
At last, sintaxonomic issues are highlighted as these hyperxerophilous broomlands detach themselves easily from main *Cytisetea scopario-striati* diagnosis, being intermixed in contrasting ecological diagnosis, with major frequency of *Calluno vulgaris-Ulicetea minoris* elements, under extremely different edaphoclimatic envelopes, different landscapes and serial dynamics.

Key words: broomlands; edaphoxerophilous vegetation; *Genista polyanthos*; hierarchical cluster analysis; phytosociology.

Introduction

Through fieldwork undertaken in the vegetation PhD study of *Serra de Monchique* in Southern Portugal and several publications such as Vila-Viçosa *et al*. (2012), Pinto-Gomes *et al*. (2012) and Quinto-Canas *et al*. (2012), we recognized a thick edaphoxerophilous broomland dominated by *Genista polyanthos* R. Roem. ex Willk. permanently escorted by *Calluno-Ulicetea* Br.-Bl. & Tüxen. species, occuring above skeletal schistose soils, especially in rocky slopes and outcrops.
Such formations, with their ecomorphological particularities, acquire a Mediterranean regional importance once *Genista polyanthos* it's an exclusive taxon from the south-western Iberian Peninsula, specifically above granites, and schistose soils (Talavera, *et al*. 1999).
Following Costa *et al*. (2004) the typical association described as *Genistetum polyanthi* Rivas-Martínez & Belmonte in Capelo, Lousã & J.C. Costa 1996, it's an open shrubland (approximately 30-40% cover) with low density of occurrence, from thermomediterranean and dry bioclimatical stages. This community, occurring in *Guadiana* river-valley, mainly in *Alentejano, Pacense, Andevalense* and *Aracenense* Districts, emerges as a edafoxerophilous and permanent community, that can incorporate the *Myrto communis-Quercetum rotundifoliae* (Rivas Goday 1959) Rivas-Martínez 1987 fringe, and the first regressive stage of *Phlomido purpureo-Juniperetum turbinatae* Capelo, Lousã & J.C. Costa 1996 (Capelo in Costa *et al*. 2004) phoenician juniper woods.
Recently Pérez-Latorre and Cabezudo (2002), proposed a new alliance (*Genistion haenselero-polyanthi* Pérez-Latorre & Cabezudo) featuring all the hyperxerophilous and thermophilous broomlands, dominated by "pillow" shaped *Genisteas*, with low cover or in the midst of subserial *Rosmarinetalia officinalis* Br.-Bl., *Lavanduletalia stoechadis* Br.-Bl. em. Rivas-Martínez and *Ulicetalia minoris* Quantin scrublands, typical from rocky slopes, or above edaphically or topographically inauspicious biotopes. They also describe this alliance as a permanent one, where the successional dynamic can´t establish itself, derived its edaphological disadvantages.
Also Pinto-Gomes and Paiva-Ferreira (2005) mentioned that *Genista polyanthos* occurrence in Algarve is not linked sinecologically to *Genistetum polyanthi* and not even to *Retamion sphaerocarpae* Rivas-Martínez 1981 sintaxon.
Dealing with this framework, we are in the presence of a *Genista polyanthos* formation with pronounced ecomorphological and floristic differences that detach from *Genistetum polyanthi*, beside its biogeographic and bioclimatic easy isolation, being present in distinct serial and territorial dynamics. Once relying on a possible new association for Iberian Southwest, this works lean towards the presentation of the obtained results.

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Study area

The analysed territory, comprehending South-western Portugal is composed by a rolling topography with soft slopes interrupt by *Monchique* sienitic massif. It is mainly a Paleozoic substrate warped by tectonic activity. The lithology is dominated by shales, siltstones and greywackes that form the *Baixo Alentejo* flysch group which is a domain from Portuguese South Zone (Granja, 1984). *Baixo Alentejo* flysch group is represented by three formations, *Mértola, Mira*, and *Brejeira* which belongs to a turbidit sequence constituted by greywackes, pelites and some interleaved conglomerates, with all flysh deposit characteristics. *Mértola Formation* from Superior Visean Stage is constituted by pelites siltstones and greywackes intercalations. The rocks fragments have a petrographic composition very similar to the Iberian Pyrite Belt formations. *Mira* formation, from Namurian also has turbidite characteristics, its principal feature being the dominance of finely stratified turbidites with low sand/clay relationship. The *Brejeira* Formation from Midle Namurian - Lower Vestefanian consists on turbidites with sedimentological characteristics, which range from impure quartzites with a relatively high clay / sand ratio, to pelites and quartzites with greywakes where ratio between sand/clay decreases (Rodrigues, 2007).

Biogeographically, following the study area focus itself in the *Monchiquense* District, being surrounded by *Algárvico, Costeiro Altoalgárvico, Promontório Vicentino* and *Sadense* Districts for Gaditan-Algarvian Subprovince, and by *Alentejano* and *Andevalense* Districts for Lusitan-Extremadurean Subprovince (Costa *et al*., 1998; Rivas-Martinez, 2007), as new biogeographic proposals are being developed for Southern Portugal by Mendes *et al*. (in press).

For bioclimatic issues we followed the last proposal made by Rivas-Martinez *et al*. (2011), engaged with the recent maps developed by Monteiro-Henriques (2010), for the Portuguese mainland, as it goes from lower thermomediterranean to lower mesomediterranean thermotypes, from lower dry, to lower hyperhumid ombrotypes and from attenuated euoceanic to attenuated euhyperoceanic continentality stages.

Materials and Methods

After field surveys, conducted from January to March (2011) and allowing the Flora and biophysical analysis, the phytosociologic approach (Braun-Blanquet, 1979; Géhu & Rivas-Martínez, 1981, updated by Rivas-Martínez, 2005; Géhu, 2006; Biondi, 2011 and Pott, 2011) was used in the relevés obtainment.

Biogeographic contextualization followed Rivas-Martinez (2007). The bioclimatic characterization of this association followed Rivas-Martinez *et al*. (2011), and was obtained by the overlap of relevés localization in the bioclimatic maps developed by Monteiro-Henriques (2010), once they represent the most up-to-date information for the Portuguese mainland.

The *taxa* identification was made mainly by the following Floras: "Flora Iberica (Castroviejo *et al*. 1986-2012); "Nova Flora de Portugal" (Franco (1984), Franco (1971-1984); Franco & Rocha-Afonso (1994; 1998; 2003); "Flora de Portugal" (Coutinho, 1939) and "Flora Vascular de Andalucía Occidental" (Valdés *et al*. 1987). Taxonomic nomenclature followed Rivas-Martínez *et al*. (2002), Castroviejo *et al*. (1986-2012) and Coutinho (1939), and sintaxonomical nomenclature followed Rivas-Martínez *et al*. (2002).

The Community Analysis Package 2004 program (version 4.1.3; Seaby & Henderson 2007) was used to carry out hierarchical cluster analysis (Ward's Agglomerative Hierarchical Clustering, based on Bray-Curtis distance) that opposed floristic variables to the considered relevés. A total of 26 relevés were treated in this current work, being 7 own relevés (A1-A7), 13 relevés (B7-B13) from Costa *et al*. (2004) and 6 relevés (BA1-BA6) from Pérez-Latorre & Cabezudo (2002).

Results

As shown in Table 1, (7 rel; *typus nominis*: rel. 5*) we are in the presence of a dense broomland of *Genista polyanthos*, with covers above 80% and approximately 2 m high. Beside the short number of *Cytisetea scopario-striati* Rivas-Martínez, and lower units' characteristic species, we can detach a frequent presence of *Calluno-Ulicetea* plants such as *Genista triacanthos* Brot., *Erica australis* L. and *Calluna vulgaris* (L.) Hull. Also revealing an increase on ombrotype features we must highlight the presence of *Ericion arboreae* Rivas-Martínez shrubs (*Arbutus unedo* L. and *Phillyrea angustifolia* L), beside the presence of *Quercus suber* L.. In the characteristic species assemblage *Lavandula luisieri* (Rozeira) Rivas Mart., assumes a major territorial role as it co-exists with *Calluno-Ulicetea* species, possessing a western Iberian distribution.

The dendrogram analysis (Figure 1), reveals two main clusters (A,B) at truncation level of 2,65, and afterwards at approximate truncation level of 1,5 we can see other smaller cluster (A1,A2).

The main cluster (A,B) highlights the separation of *Genistetum polyanthi* (Gp - group A) relevés and the ones obtained during this work (G-tp - group B).

Within Gp group, Cluster A1 represents relevés made in *Guadiamar* basin and Cluster A2 represents *Guadiana* Basin relevés, which shows a high similarity between them, as shown by the presence of two *Guadiamar* basin relevés (BA13 and BA5) in cluster A2,

Tab. 1 - *Genistetum triachanthi-polyanthi* ass. nova hoc loco.

Number	7	3	2	10	8	11	9	
Area (sq.m)	200	200	300	200	250	150	200	
Altitude (m)	105	64	90	250	125	270	135	
Cover (%)	80	85	90	90	90	80	90	Presences
Exposure	SO	E	S	S	SE	NE	S	
Slope (º)	35	20	15	15	20	25	15	
Average height (m)	2	1,5	2	2	2	1,5	2	
Ordinal Number	1	2	3	4	5	6	7	
Association and higher units characteristics								S
Genista polyanthos R. Roem. ex Willk.	4	5	4	5	5	5	4	V
Lavandula luisieri (Rozeira) Rivas Mart. (Ass. Diff.)	2	1	2	2	2	1	2	V
Genista triacanthos (Spach) Cout. (Ass. Charact.)	-	+	1	-	2	1	1	IV
Erica australis L. (Ass. Charact.)	-	-	1	-	+	-	+	III
Ulex argenteus Welw. ex Webb (Ass. Diff.)	-	-	-	2	1	2	1	III
Calluna vulgaris (L.) Hull (Ass. Diff.)	-	-	-	-	-	+	1	II
Centaurea prolongoi Boiss. ex DC.	-	-	-	-	-	-	1	I
Companions								
Cistus ladanifer L.	2	1	1	2	2	+	1	V
Dactylis hispanica subsp. lusitanica (Stebbins & Zohary) Rivas Mart. & Izco	+	1	-	+	+	+	-	IV
Phagnalon saxatile (L.) Cass.	2	-	-	-	1	-	1	III
Lavandula viridis L'Hér.	+	1	-	-	-	+	-	III
Quercus suber L.	+	-	+	-	+	+	-	III
Cistus salviifolius L.	+	-	-	+	+	+	-	III
Carlina corymbosa L.	+	-	-	+	+	-	-	III
Sanguisorba minor Scop.	+	-	-	+	-	+	-	III
Leontodon tuberosus L.	-	1	-	+	-	+	-	III
Dittrichia viscosa subsp. revoluta (Hoffmanns. & Link) P. Silva & Tutin	-	+	1	-	+	-	-	III
Arbutus unedo L.	-	+	-	+	+	-	+	III
Daphne gnidium L.	-	+	-	+	-	+	+	III
Quercus rotundifolia Lam.	-	+	-	+	-	1	-	III
Aristolochia paucinervis Pomel	-	+	-	-	+	+	-	III
Thapsia villosa L.	-	-	-	+	+	+	-	III
Erica arborea L.	-	-	-	+	1	+	+	III
Genista hirsuta Vahl	-	-	-	+	+	+	-	III
Helichrysum stoechas (L.) Moench	-	-	-	+	+	+	-	III
Pulicaria odora (L.) Rchb.	-	-	-	+	-	+	+	III
Picris echioides L.	-	-	-	+	+	+	+	III
Olea europaea var. sylvestris (Mill.) Rouy ex Hegi	+	1	-	-	-	-	-	II
Rumex induratus Boiss. & Reut.	+	-	-	-	1	-	-	II
Calendula suffruticosa subsp. lusitanica (Boiss.) Ohle	+	-	-	-	+	-	-	II
Myrtus communis L.	+	-	-	-	-	+	-	II
Cynara algarbiensis Coss. ex Mariz	-	-	1	-	+	-	-	II
Pistacia lentiscus L.	-	-	-	+	-	+	-	II
Orchis morio L.	-	-	-	+	-	+	-	II
Urginea maritima (L.) Besser	-	-	-	+	-	+	-	II
Phlomis purpurea L.	-	-	-	+	-	+	-	II

mainly because these last ones consist in poor relevés, with a low number of companion species. The G-tp (Cluster B) group shows the G-tp relevés, which correspond to the new association here proposed.

Regarding Table 2 and the presence/absence of floristic elements which determine the dendrogram groups definition, we can detach as main differential groups of species the frequent presence of *Calluno-Ulicetea* plants (*Genista triacanthos, Erica australis* and *Calluna vulgaris*), beside the absence of characteristic species from *Genistetum polyanthi* as *Retama shaperocarpa* (L.) Boiss. and *Cytisus scoparius* subsp. *bourgaei* (Boiss.) Rivas Mart., Fern. Gonz. & Sánchez Mata, which as *Retamion sphaerocarpae* characteristics can not reach these hyperoceanic territories. By other side, giving its continental and dryer character, *Genistetum polyanthi* owns also territorial-exclusive species, such as *Asparagus albus* L., *Ulex eriocladus* C. Vicioso, *Ditrichia viscosa* (L.) Greuter, and *Fluggea tinctoria* (L.) G.L. Webster (Table 2).

Enhancing companion species, with territorial character, is important to highlight the presence of taxa such as *Lavandula viridis, Ulex argenteus* Welw. ex Webb, *Lavandula luisieri* (Rozeira) Rivas Mart., *Dittrichia viscosa* subsp. *revoluta* (Hoffmanns. & Link) P. Silva & Tutin, *Cynara algarbiensis* Mariz, as well as *Phagnalo saxatilis-Rumicetalia indurati* Rivas Goday & Esteve endemisms like *Calendula suffruticosa* subsp. *lusitanica* (Boiss.) Ohle and *Centaurea prolongoi* Boiss. ex DC. (Table 1).

Discussion

As being both thermomediterranean (Figure 2-A), the main floristic and ecomorpholgical differences between *Genistetum triachanthi-polyanthi* and *Genistetum*

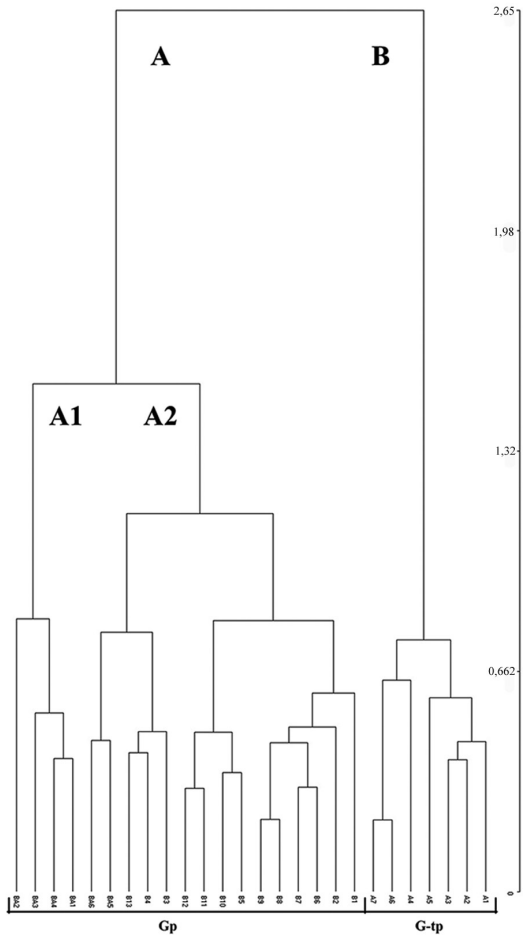

Fig 1 - Ward's hierarchical clustering, based on Bray-Curtis distance: G-tp - *Genistetum triachanthi-polyanthi*; Gp - *Genistetum polyanthi*.

Tab. 2 – Synthetic table of *Genista polyanthos* associations in Southern Portugal. G-tp – *Genistetum triachanthi-polyanthi* ass nova hoc loco (7 rel.), and Gp - *Genistetum polyanthi* Rivas-Martínez & Belmonte in Capelo, Lousã & J.C. Costa 1996 (19 rel.).

Number of relevés	7	19
Association and Higher units Characteristics and Differentials	*G-tp*	*Gp*
Genista polyanthos R. Roem. ex Willk.	V	V
Lavandula luisieri (Rozeira) Rivas Mart.	V	.
Genista triacanthos (Spach) Cout.	IV	.
Erica australis L.	III	.
Ulex argenteus Welw. ex Webb	III	.
Calluna vulgaris (L.) Hull	II	.
Centaurea prolongoi Boiss. ex DC.	I	.
Retama shaperocarpa (L.) Boiss.	.	III
Cytisus scoparius subsp. bourgaei (Boiss.) Rivas Mart., Fern. Gonz. & Sánchez Mata	.	+
Companions		
Cistus ladanifer L.	V	V
Dactylis hispanica subsp. lusitanica (Stebbins & Zohary) Rivas Mart. & Izco	IV	.
Quercus suber L.	III	.
Dittrichia viscosa subsp. revoluta (Hoffmanns. & Link) P. Silva & Tutin	III	.
Arbutus unedo L.	III	.
Erica arborea L.	III	.
Lavandula viridis L'Hér.	III	.
Daphne gnidium L.	III	.
Aristolochia paucinervis Pomel	III	.
Helichrysum stoechas (L.) Moench	III	.
Leontodon tuberosus L.	III	.
Picris echioides L.	III	.
Sanguisorba minor Scop.	III	.
Pulicaria odora (L.) Rchb.	III	.
Phagnalon saxatile (L.) Cass.	III	II
Quercus rotundifolia Lam.	III	II
Carlina corymbosa L.	III	+
Cistus salviifolius L.	III	+
Urginea maritima (L.) Besser	II	II
Olea europaea var. sylvestris (Mill.) Rouy ex Hegi	II	I
Phlomis purpurea L.	II	+
Pistacia lentiscus L.	II	+
Myrtus communis L.	II	+
Rumex induratus Boiss. & Reut.	II	.
Orchis morio L.	II	.
Cynara algarbiensis Coss. ex Mariz	II	.
Calendula suffruticosa subsp. lusitanica (Boiss.) Ohle	II	.
Phillyrea angustifolia L.	I	.
Brachypodium phoenicoides (L.) Roem. & Schult.	I	.
Thapsia transtagana Brot.	I	.
Bituminaria bituminosa (L.) C.H. Stirt.	I	.
Bryonia dioica Jacq.	I	.
Lathyrus clymenum L.	I	.
Lonicera implexa Aiton	I	.
Quercus coccifera L.	I	.
Rhamnus oleoides L.	I	.
Ruta angustifolia Pers.	I	.
Chamaerops humilis L.	I	II
Asphodelus aestivus Brot.	I	II
Cistus monspeliensis L.	I	II
Pyrus bourgaeana Decne.	I	+
Arum italicum subsp. neglectum (Towns.) Prime	I	+
Teucrium hanseleri Boiss.	I	+
Genista hirsuta Vahl	I	II
Asparagus aphyllus L.	+	II
Lavandula sampaioana (Rozeira) Rivas Mart., T.E. Díaz & Fern. Gonz.	.	IV
Asparagus albus L.	.	II
Ulex eriocladus C. Vicioso	.	II
Asparagus acutifolius L.	.	II
Hyparrhenia sinaica (Delile) Llauradó ex G. López	.	II
Thymus mastichina (L.) L.	.	II
Rosmarinus officinalis L.	.	I
Hyparrhenia podotricha (Hochst. ex Schimp.) Anderson ex Romero Zarco	.	I
Allium pallens L.	.	+
Arisarum vulgare Targ.-Tozz.	.	+
Asparagus horridus L. in J.A. Murray	.	+
Cistus albidus L.	.	+
Daucus setifolius Desf.	.	+
Dianthus crassipes R. Roem.	.	+
Ditrichia viscosa (L.) Greuter	.	+
Erica scoparia L.	.	+
Flueggea tinctoria (L.) G.L. Webster	.	+
Juniperus turbinata Guss.	.	+
Linaria amethystea (Vent.) Hoffmanns. & Link	.	+
Micromeria graeca (L.) Benth. ex Rchb.	.	+
Nerium oleander L.	.	+
Osyris alba L.	.	+
Phlomis lychnitis L.	.	+
Sanguisorba verrucosa	.	+
Scrophularia canina L.	.	+
Sedum amplexicaule (Link ex G. Don) Ces.	.	+
Teucrium fruticans L.	.	+

polyanthi comes with the ombrotype increase (Figure 2-B), and by reaching sharper oceanic territories (Figure 2 –C). Indeed *Genistetum triachanthi-polyanthi* can get to upper subhumid and lower humid ombrotypes, in *Serra de Monchique* (Figure 2-B), besides reaching semi hyperoceanic territories (Figure 2-C). These facts demonstrate a great territorial difference to *Guadiana* Basin, which is a dry and euoceanic territory, from where *Genistetum polyanthi* is characteristic. These edaphoclimatic peculiarities also explains the entire ecomorphological differentiation, facing *Genistetum triachanti-polyanthi* that emerges as a thick broomland, always with more than 80% coverage and with a medium height of 2 m high, mixing itself preferentially with *Ericion umbellatae* Br.-Bl., P.Silva, Rozeira & Fontes em. Rivas-Martínez heatlands, *Ericion arboreae* mantles and promptly *Cisto ladaniferi-Ulicetum argentei* Br.-Bl., P.Silva & Rozeira 1964 gorselands.

Biogeographically, and following Costa *et al.* (1998), all these particularities are also corroborated, once *Genistetum triachanthi-polyanthi* is predominantly from *Monchiquense* District (Figure 2-D). It is also exclusive from subhumid and humid ombrotypes, and with a western distribution area, covering *Calluno-Ulicetea* realm, which is related to precipitation cycles, that enhances its domain facing *Cisto-Lavanduletea* Br.-Bl. 1940. Contrarily, *Genistetum polyanthi* exists in *Alentejano, Aracenense, Andevalense* and *Pacencese* Districts, as a permanent community, being exclusively accompanied by *Ulici argentei-Cistion ladaniferi* Br.-Bl., P.Silva & Rozeira 1964 em. Rivas-Martínez 1979 species, as both associations belongs to *Marianic-Monchiquensean* Sector.

As serial considerations, it's important to enhance this association by having an high value, as *Genistetum triachanthi-polyanthi* belongs to edaphophilous subserial mantles, intermixed with *Erico australis-Cistetum populifolii* Rivas-Goday 1955 heatlands, whether in secondarious cork-oak woodlands, above

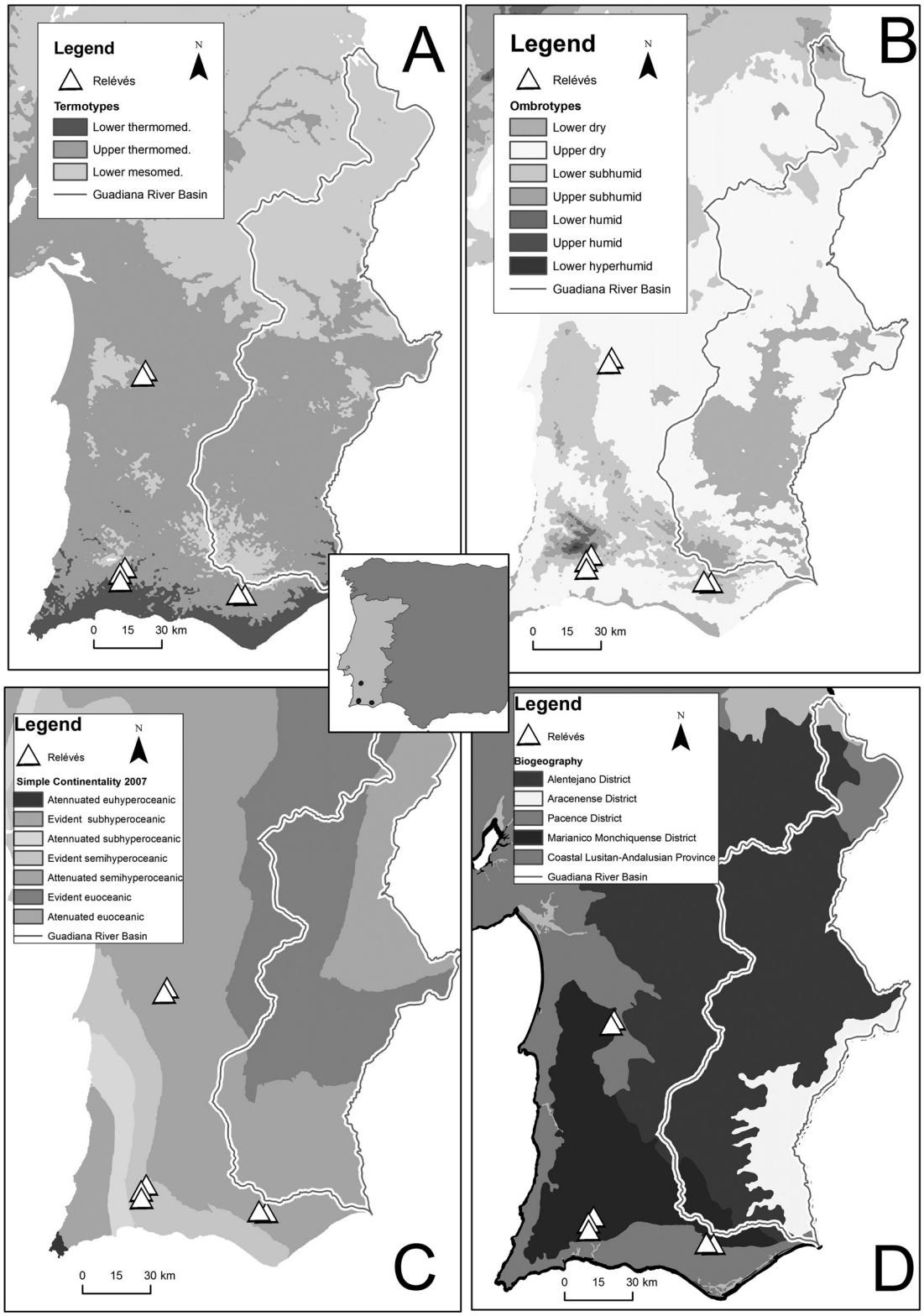

Fig. 2 - *Genistetum triachanthi-polyanthi* relevés locations. A – *Genistetum triachanthi-polyanthi* Study area Thermotypes (Adapted from Monteiro-Henriques, 2010); B - *Genistetum triachanthi-polyanthi* Study area Ombrotypes (Adapted from Monteiro-Henriques, 2010); C - *Genistetum triachanthi-polyanthi* Study area Continentality (Adapted from Monteiro-Henriques, 2010; D - *Genistetum triachanthi-polyanthi* Biogeographical Context (Adapted from Costa *et al*, 1998).

skeletal soils, of *Lavandulo viridis-Querco suberis* S. Quinto-Canas, Vila-Viçosa, Meireles, Paiva-Ferreira, Martínez-Lombardo, Cano & Pinto-Gomes 2010 (Quinto-Canas, *et al*. 2010) rather rarely, in edaphoxerophilous holm-oak woodlands of *Ulici argentei-Quercetum rotundifoliae* Quinto Canas et. al inéd (Figure 3-A). Mostly as fringes and regression steps, also above skeletal soils or outrcrops, it occurs in areas where natural potential vegetation consists in a *Quercus marianica* C. Vicioso woodland, with marcescent character, that mostly comprehends the climatophilous vegetation in the *Monchiquense* District (Vila-Viçosa, 2012), mainly due to the decrease in continentality index (eu-hyperoceanic), and consequent increase in ombrothermic stages (subhumid to humid).

Facing *Andevalense* district, *Genistetum polyanthi* appears as subserial stage on edaphoxerophilous *Phoenician Juniper* open-woods (*Phlomido purpureo-Juniperetum turbinatae*), and as well intermixed in *Myrto communis-Quercetum rotundifoliae lavanduletosum viridis* Mendes *et al*. inéd. climatophilous woodlands (Figure 3-B).

These broomlands are normally composed by a *Genista polyanthos* thick shrub layer, almost paucispecific, mainly accompanied by *Ericion umbellatae* and *Cisto ladaniferi-Ulicetum argentei* Br.-Bl., P.Silva & Rozeira 1964 scrublands, that can occur in opened *Quercus suber* formations, or even among *Cisto populifolii-Arbutetum unedonis* Br.-Bl., P. Silva & Rozeira nom. inv shrublands, so it can incorporate climbing taxa as *Lonicera implexa, Aristolochia paucinervis* and nemoral herbs as *Arum italicum* subsp. *neglectum*. The herb layer can also include perennial grasslands dominated by *Dactylis hispanica* subsp. *lusitanica*, *Leontodon tuberosus* and sometimes with *Brachypodium phoenicoides*, which emphasizes the climaccic domain of *Quercus marianica* woodlands, being one of the characteristic regression stages belonging to *Stipo giganteae-Agrostietea castellanae* Rivas-Martínez, Fernández-González & Loidi 1999. Finally, the presence of some rupicolous, sub-nitrophilous species as *Picris echioides* and *Cynara algarbiensis* must be enhanced as these species stress the skeletal soils and the edaphoxerofilous position of this peculiar community.

So, despite the proposals presented by Pérez-Latorre & Cabezudo (2002), who created a mixed calcicolous and simultaneously silicicolous alliance (*Genistion haenselero-polyanthi*), we decided to put this association in *Ericion umbellatae* syntaxon, by its companions domain, fulfilling the analogy made by Aguiar (2011) maintaining these broomlands with *Genista hystrix* Lange. in *Cisto-Lavanduletea* Br.-Bl. in Br.-Bl., Molinier & Wagner, due the respective domain of characteristic species, but also mentioning the dichotomy and possible filiation in *Ericenion aragonensis* Rivas-Martínez 1979. Therefore, facing this disperse sintaxonomical range where these communities occur, deeper studies must be carried out following this

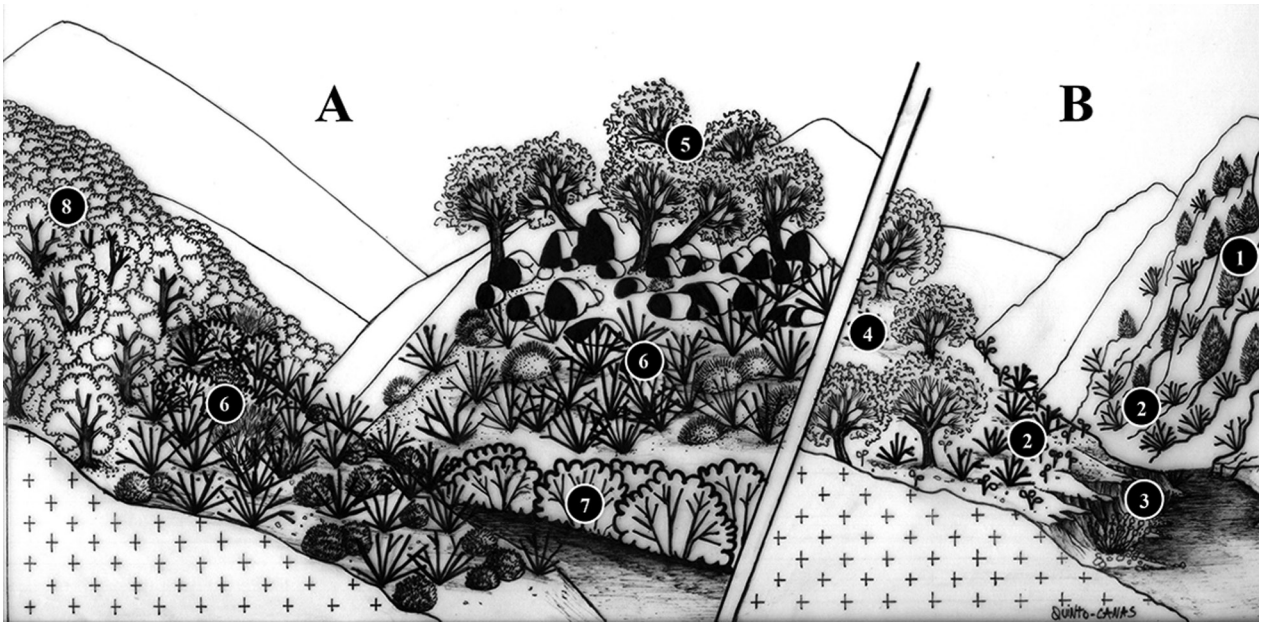

Fig. 3 – Schematic view on landscape serial-dynamic facing *Monchiquense* District and *Andevalense* District with correspondent *Genista polyanthos* broomlands. A – *Monchiquense* District; B – *Andevalense* District; 1 - *Phlomido purpureo-Juniperetum turbinatae;* 2 - *Genistetum polyanthi*; 3 - *Tamaricetalia africanae* Br.-Bl. & O. Bolòs 1958 em. Izco, Fernández-González & Molina 1984; 4 - *Myrto communis-Quercetum rotundifoliae lavanduletosum viridis* Mendes et al. inéd; 5 – *Ulici argentei-Quercetum rotundifoliae* Quinto-Canas et. al. inéd.; 6 - *Genistetum triachanti-polyanthi* ass nova. hoc. loco; 7 - *Salici purpureae-Populetea nigrae* (Rivas-Martínez & Cantó ex Rivas-Martínez, Báscones, T.E. Díaz, Fernández-González & Loidi) Rivas-Martínez & Cantó 2002; 8 - *Lavandulo viridis-Quercetum suberis*.

hyperxerofilous broomlands, typical of skeletal soils, in the entire Iberian Peninsula, inclusively spread to *Echinospartum* (Spach) Fourr. formations. These deeper studies should be focused especially to higher sintaxon range, as these communities deviate from the typical ecology of *Cytisetea scopario-striati*, above siliceous and deep soils, with humus "mull". Even though they lack in common species, as they comprise biogeographic “islands”, departed from each other, they should be matter for new studies that can clarify the correct syntaxonomic position and true sinecologic nature of these communities.

Still regarding the filiation on *Retamion sphaerocarpae* of *Genistetum polyanthi*, the presence of *Retama shaperocarpa* and *Cytisus scoparius* subsp. *bourgaei*, are always associated to deeper soil positions and always with a exiguous relative frequence, never exceeding 1% coverage in most relevés, being in reality detached from the original and homogeneous ecological conditions of *Genistetum polyanthi*, which stands above skeletal soils and outcrops, as this may suggest this is not a *Cytisetea scopario-striati* community.

For taxonomical issues, it would be relevant to develop also studies resembling *Genista polyanthos*, as these populations from *Monchiquense* District, separated from those original from *Guadiana* and *Guadiamar* basin, could have differences as they have been identified as *Genista hystrix* in the littoral lower *Alentejo*, by Domingues de Almeida (2003), leading to a probable taxonomic inaccuracy, as the holotypus belonging to *Genista polyanthos* is original from *Monchique* (road leading to Silves), in the midst of *Genistetum triachanthi-poolyanthi* broomland. This fact probably reinforces the assumption of Franco (1971) regarding the new combination and status of *Genista hystrix* Lange as a subspecies of *Genista polyanthos* [(*Genista polyanthos* subsp. *hystrix* (Lange) Franco] remaining the populations from *Guadiana* and *Guadiamar* basin with the need of further taxonomical analyses.

Concluding the theme, numerical and phytosociological analysis of 26 relevés has resulted in the proposal of a new edaphoxerophilous, thermomediterranean, with major oceanic influence, subhumid to humid broomland association, named *Genistetum triachanthi-polyanthi*.

Despite its particular sinecology, these communities are not specially threatened, given the territory general conservational status, where recurrent fire cycles, alongside agricultural land uses, with deep soil mobilizations and other erosive factors, favors the potential vegetation regressive steps, which overwhelm the local landscape.

The occurrence of differential species, either from *Cytisetea scopario-striati* characteristics, either in the companions group of plants, beside its chorological and bioclimatic segregation, detaches easily this association from *Genistetum polyanthi*.

Existing as edaphoxerophilous community and having such sinecological importance in the serial and catenal point of view, these communities also includes particular groups of plants, namely *Phagnalo saxatilis-Rumicetalia indurati* endemisms.

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Syntaxonomical scheme

CALLUNO-ULICETEA Br.-Bl. & Tüxen ex Klika & Hadač 1944
ULICETALIA MINORIS Quantin 1935
Ericion umbellatae Br.-Bl., P. Silva, Rozeira & Fontes 1952 em. Rivas-Martínez 1979
Ericenion umbellatae Rivas-Martínez 1979
Cisto-Ulicetum minoris Br.-Bl., P.Silva & Rozeira 1964
Carici piluliferae-Genistetum triacanthi Honrado, P. Alves, B. Caldas 2005
Erico australis-Cistetum populifolii Rivas-Goday 1955
Erico umbellatae-Ulicetum welwitschiani Capelo, J.C. Costa, Neto & Lousã in J.C. Costa, Capelo, Neto, Espírito-Santo & Lousã 1997
Erico umbellatae-Pterospartetum tridentati (Br.-Bl., P. Silva & Rozeira 1964) J.C. Costa, Capelo, Honrado, Monteiro-Henriques & Aguiar 2008
Genisto triacanthi-Stauracanthetum spectabilis Rivas-Martínez, Lousã, T.E. Días, Fernández-González & J.C. Costa 1990 corr. Capelo 1999
Halimio alyssoidis-Pterospartetum cantabrici (Br.-Bl., P. Silva & Rozeira 1964) F. Prieto in T.E. Díaz 1990 corr. Honrado 2008
Halimio lasianthi-Ulicetum minoris Capelo, J.C. Costa & M. Lousã 1994
Halimio ocymoidis-Cistetum psilosepali Br.-Bl., P.Silva & Rozeira 1964
Halimio ocymoidis-Ericetum umbellatae Rivas-Goday 1964
Halimio umbellati-Ulicetum minoris Antunes 1996

Lavandulo luisieri-Ulicetum jussiaei J.C. Costa, Ladero, T.E. Diáz, M. Lousã, M.D. Espírito-Santo, Vasconcelos, T. Monteiro & A. Amor 1993
Polygalo microphyllae-Cistetum populifolii Rivas Goday 1964
Pterosparto lasianthi-Ericetum cinereae Rothmaler 1954 corr. Rivas-Martínez, T.E. Díaz, Fernández González, Izco, Loidi, Lousã & Penas 2002
Thymo villosae-Ulicetum airensis J.C. Costa, Capelo, Espírito-Santo & Lousã in J.C. Costa, Capelo, Neto, Espírito-Santo & Lousã 1997
Ulici airensis-Ericetum scopariae Espírito-Santo, Capelo, Lousã & J.C. Costa in Espírito-Santo, Lousã, J.C. Costa & Capelo 2000
Ulici eriocladi-Ericetum andevalensis (A.V. Pérez, Nieto & Cabezudo 1993) Cabezudo & A.V. Pérez 1999
Ulici eriocladi-Ericetum umbellatae Rivas-Martínez 1979
Ulici micranthi-Pterospartetum (Rothmaler 1954) Tüxen & Oberdorfer 1958
Genistetum triachanthi-polyanthi Vila-Viçosa, Mendes, Meireles; Quinto-Canas & Pinto-Gomes ass. nova *hoc loco*

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Appendix 1: Sporadic species

Table 1: *Cistus monspeliensis* L. + (1); *Lonicera implexa Aiton* +, *Asphodelus aestivus* Brot. +, *Lathyrus clymenum* L. + (2); *Epipactis lusitanica* D. Tyteca + (4); *Bituminaria bituminosa* (L.) C.H. Stirt. 1, *Rhamnus oleoides* L. +, *Chamaerops humilis* L. +, *Quercus coccifera* L. +, *Ruta angustifolia* Pers. + (5); *Brachypodium phoenicoides* (L.) Roem. & Schult. +, *Thapsia transtagana* Brot. 1, *Bryonia dioica* Jacq. 1, *Arum italicum* subsp. *neglectum* (Towns.) Prime +, (6); *Pyrus bourgaeana* Decne. +, *Phillyrea angustifolia* L. +, *Teucrium hanseleri* Boiss. + (7).

Appendix 2: Localities

Table 1:1 – Rasmalho (Porto de Lagos); 2 – Azinheira dos Barros; 3- Minas do Lousal; 4 – Clareanes (Querença); 5 - Barracão (Caldas de Monchique); 6 – S. Brás de Alportel; 7 – Caldas de Monchique