Contribution to the study of the *Taeniathero-Aegilopion geniculatae* alliance in Portugal

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Abstract.- This paper deals with the study of *Taeniathero-Aegilopion geniculatae* subnitrophilous communities found in the centre and south of Portugal, particularly in abandoned olive groves with vegetal cover. The edaphic and phytosociological study reveals that these pasturelands thrive on neutro-basic soils. In the corresponding dendrogram and in the co-location network, their peculiar floristic composition and, in particular, the co-existence of acidophilous and basophilous species give rise to a cluster of relevés distinctly separated from the rest. Consequently we propose the new *Plantagini bellardii-Aegilopetum geniculatae* association. It is different from the rest not only because of a number of differential species, but also for ecological reasons. In this respect, the edaphic analysis clearly reveals that all these samples correspond to soils with a pH value equal to or higher than 7, whereas the closest association, *Trifolio cherleri-Taenitheretum capitis-medusae,* presents a pH record below 7. There are also differences as far as the biogeographical unit and the vegetation series are concerned.

Key words : pastureland - subnitrophilous - plant association - edaphic - Portugal.

Résumé.- Nous avons mené une étude des communautés subnitrophiles du *Taeniathero-Aegilopion geniculatae* dans le centre et le sud du Portugal dans les olivettes abandonnées végétalisées. L'étude édaphique et phytosociologique montre que ces pelouses croissent sur des sols neutro-basiques. Par la composition floristique caractéristique, dans le dendrogramme et dans la grille d'emplacement, se sépare des autres un groupe de relevés, séparation liée à la coexistence d'espèces acidophiles et basophiles. Par conséquent, nous proposons ici la nouvelle association *Plantagini bellardii-Aegilopetum geniculatae,* différente des autres par un ensemble d'espèces différentielles et par son écologie, puisque l'analyse édaphique montre que tous les relevés se trouvent dans des sols à pH égal ou supérieur à 7, tandis que l'association la plus proche, le *Trifolio cherleri-Taenitheretum capitis-medusae,* présente un pH inférieur à 7. Il y a aussi des différences phytogéographiques et dynamiques.

Mots clés : pelouses - subnitrophile - association végétale - édaphique - Portugal.

I. INTRODUCTION

This survey on edaphic bioindicators involved the sampling of different types of pasturelands in the Portuguese Alentejo and a number of territories in Spain and Italy. Our work focuses mainly on the subnitrophilous pasturelands of *Taeniathero-Aegilopion geniculatae* Rivas-Martínez & Izco 1977, which we studied in Portugal and Spain (Cano-Ortiz, 2007). Although many authors have studied this alliance (Rivas-Martínez & Izco, 1977; García Fuentes *et al.*, 2000 ; Santos *et al.*, 1988; Cano & García Fuentes, 1994; Cano *et al.*, 1998; Rivas-Martínez *et al.*, 2001; Pinto-Gomes & Paiva-Ferreira, 2005), the phytosociological and edaphic profile of these pasturelands has been never dealt with. This paper aims at filling this gap.

II. MATERIALS AND METHODS

The paper studies the *Taeniathero Aegilopion geniculatae* communities in Portugal. The area under study corresponds to the Alentejo, Beixa, Castelo Branco (Fig. 1). The field work involved the implementation of 40 phytosociological relevés of subnitrophilous pasturelands and 20 relevés of pure pasturelands. For this purpose we first took a preliminary area of 0.5 m^2, made a relevé and recorded the number of species present. Then, we progressively enlarged the initial area at the rate of 0.5 m^2, up to the point where the number of species recorded increased less than 10% as compared with the number recorded in the preceding smaller area.

The naming of the taxa was made following a number of bibliographical references: *Flora Ibérica* (Castroviejo e*t al.* (eds), 2001), *Flora Europaea* (Tutin *et al.*, 1964-1980), *Flora Andalucía Occidental* (Valdés *et al.*, 1987) and, especially, the Flora de Pereira (1939). We also took soil samples to analyze the most relevant edaphic parameters as far as the occurrence of the taxa is concerned: cationic exchange capacity, carbonates, Ca, assimilable P, Mg, OMM %, N, pH, K, salinity and texture. The phytosociological analysis was made according to the methods suggested by Braun Blanquet (1979) and Rivas-Martínez *et al.* (2001). The study also carries out a comparative analysis of the closest associations by means of a synthetic table (Table I).

We carried out a cluster analysis to obtain the relevant grouping in order to establish the relationships between the different phytosociological samplings. For this purpose we used the programmes *Cluster* and *Tree View* (*http://rana.lbl.gov/EisenSoftware.htm*).

In order to analyze the occurrence of the most generalist species in the different associations under study and to back up the proposal for new associations and to describe the relationships between these and other associations previously discussed, we generated phytosociological co-location networks. By so doing, we obtained graphs in which the nodes correspond to the characteristic species of the associations and the interconnecting arcs indicate that both species co-locate in a shared association. Therefore, the matrices used contain pairs of data corresponding to species which occur in the same locations.

We used the programme *Pajek* 1.10 (*http://vlado.fmf.uni-lj.si/pub/networks/pajek/*) to generate the networks. The representation algorithm was that of Kamada-Kawai. The species belonging to one single association are represented by circular nodes and are peripheral to the graph. By contrast, those which co-locate in two or more associations tend to appear in the centre of the graph.

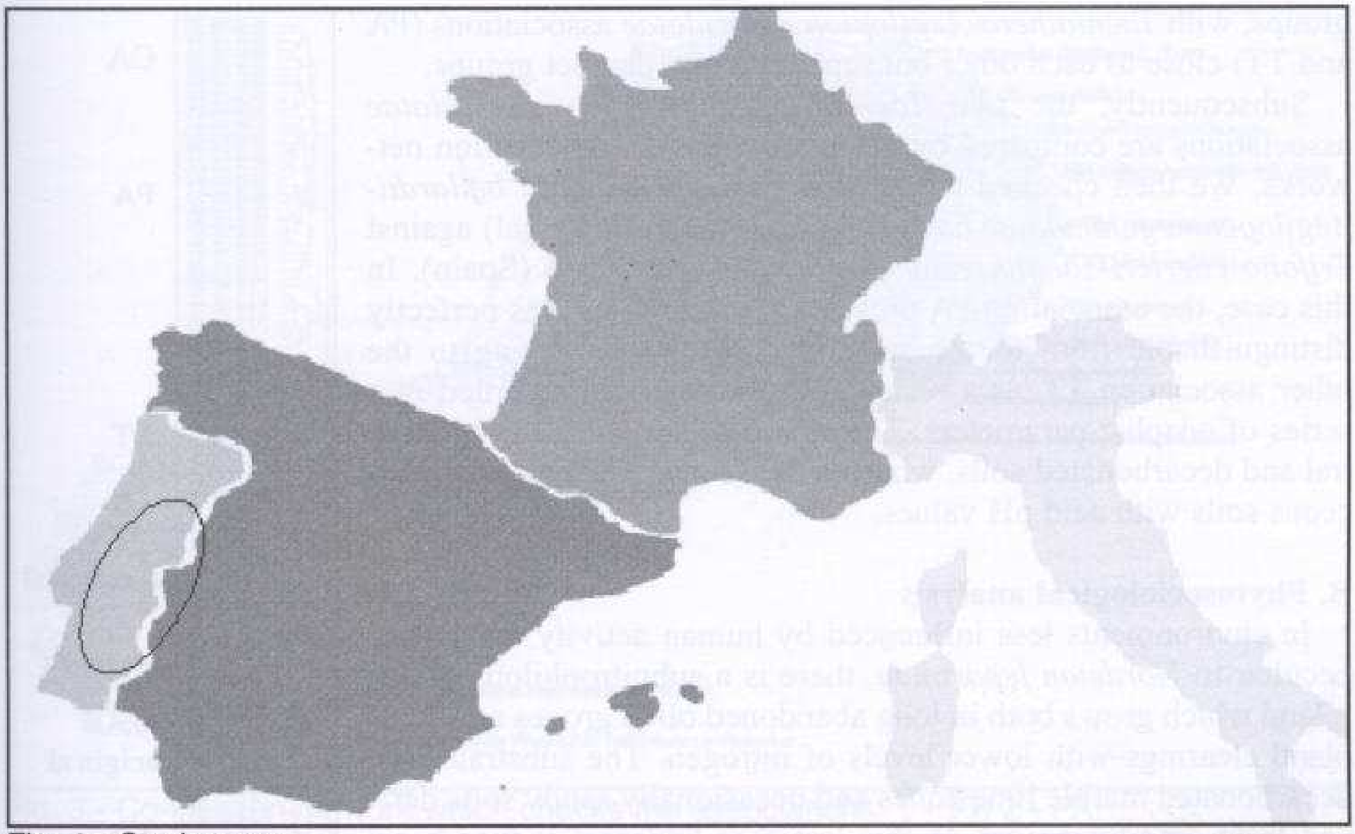

Fig. 1.- Study area.
Fig. 1.- Territoire de l'étude.

III. RESULTS AND CONCLUSIONS

The territory under study is not only characterized by the presence of decarbonated soils derived from marbles, but also by the occurrence of granites which, through decomposition, give rise to soils rich in feldspars. As a result of the substrates and the Mediterranean, pluviseasonal bioclimate, the soils produced in this way have a pH-value close to neutrality. In the mesomediterranean belt the rainfall rates range from 909 mm (Marvão) to 437 mm (Moura). The Io and Ic values range from 5.96 and 16 (Marvão) to 2.08 and 16.5 (Moura). Rivas-Martínez and Loidi (1999a) consider, consequently, that the study area has an ombrotype ranging from subhumid (Marvão) to dry (Moura). As far as the biogeographical location is concerned, according to Rivas-Martínez & Loidi (1999b) and Rivas-Martínez (2007), the territory under study is included in the Marianic-Monchiquensean and Toledan-Taganean sectors.

A. Statistical analysis

In order to determine whether or not certain phytosociological samples belong to the *Hordeion leporinum* alliance or to the *Taeniathero-Aegilopion geniculatae* alliance, we carried out a comparative analysis of relevés taken in Spain, Portugal and Italy. For this purpose, in the cluster (Fig. 2), we put together relevés corresponding to *Plantagini-Aegilopetum geniculatae* (PA) with relevés of *Convolvulo-Aegilopetum geniculatae* (CA), *Securigero-Dasypiretum villosii* (SD), *Aveno-Brometum diandri* (AB) and *Trifolio-Taeniatheretum capitis-medusae* (TT). The ensuing dendrogram reveals clearly structured groups, with *Taeniathero-Aegilopion geniculatae* associations (PA and TT) close to each other but separated into distinct groups.

Subsequently, the two *Taeniathero-Aegilopion geniculatae* associations are compared by means of graphical co-location networks. We then checked the species of the *Plantagini bellardii-Aegilopetum geniculatae nova* (PA) association (Portugal) against *Trifolio cherleri-Taenitheretum capitis-medusae* (TT) (Spain). In this case, the association PA presents a group of species perfectly distinguishable from the characteristic species belonging to the other association TT, as a result of the differences recorded in a series of edaphic parameters. The first association grows on neutral and decarbonated soils, whereas the second one grows on siliceous soils with acid pH values.

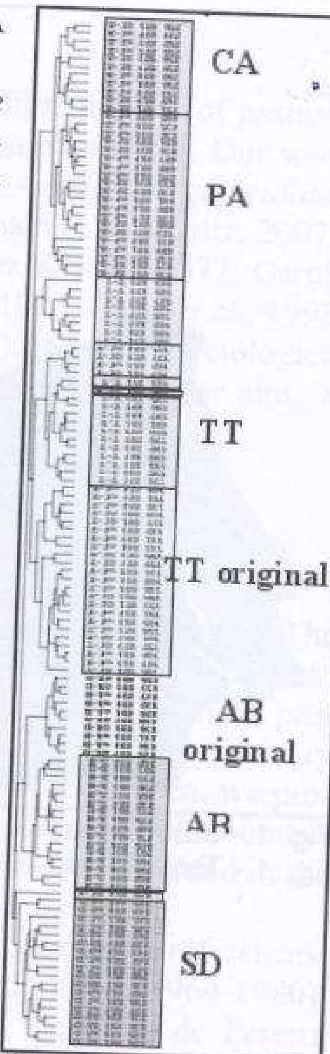

Fig. 2.- Statistical analysis (cluster).
Fig. 2.- Analyse statistique (cluster).

B. Phytosociological analysis

In environments less influenced by human activity than those peculiar to *Hordeion leporinum*, there is a subnitrophilous pastureland which grows both in long abandoned olive groves and scrubland clearings with lower levels of nitrogen. The substrates are decarbonated marble limestones and occasionally sandy soils derived from granite erosion. In this last case feldspars induce basic soils with pH values close to neutrality. The subnitrophilous pastureland of *Aegilops geniculata* differs both from *Trifolio cherleri-Taeniatheretum caput-medusae* Rivas-Martínez & Izco 1977, of a silicicolous character (Table III), because of the occurrence of basophilous taxa such as *Medicago minima, Atractylis cancellata, Polygala monspeliaca, Velezia rigida*, and from *Medicagini rigidulae-Aegilopetum geniculatae* Rivas-Martínez & Izco 1977 because of the occurrence of silicicolous taxa, such as *Plantago bellardii, Trifolium subterraneum* (Table I). Consequently, we propose the *Plantagini bellardii-Aegilopetum geniculatae nova association* (Table II, inv. 1-21; *typus nominis*: rel. 3), which grows on decarbonated substrates, on soils rich in feldspaths and in sunny environments belonging to the mesomediterrenan belt and dry-subhumid ombrotype. In sunny and more thermic exposures, this pastureland gives way to the community of *Aegilopo neglectae-Stipetum capensis* M.T. Santos *ex* Cano, A. García, Torres & Salazar 1998 and differs from the pure silicicolous pasturelands of *Trifolio cherleri-Plantaginetum bellardii* and *Velezio rigidae-Asteriscetum aquatici* not only in its structure but also in its cover rate and floristic composition. The new association proposed here is found on all Lusitan-Extremadurean, calcareous soils (Portugal and Spain) within the series of *Lonicero implexae-Querco rotundifoliae* (Pinto-Gomes & Lazare, 2002).

C. Edaphic analysis

The *Plantagini bellardii-Aegilopetum geniculatae* pasturelands are usually found on red soils with neutral or almost neutral pH values (ranging from 6.7 and 8.2; average value of 7.581). By contrast, the pH values recorded for the associations *Trifolio cherleri-Plantaginetum bellardii* and *Trifolio cherleri-Taeniatheretum capitis-medusae* are 6.047 and 6.130 respectively, which correspond to acid substrates. The comparative analysis

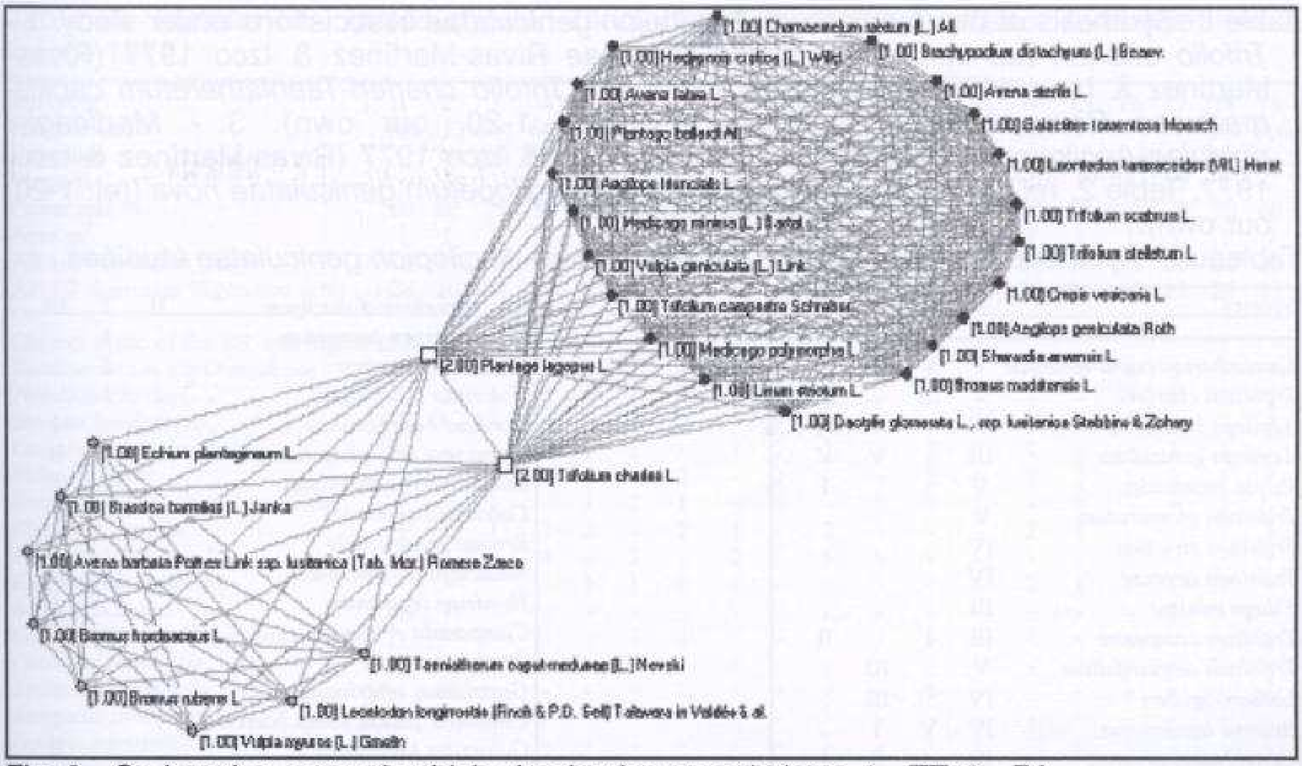

Fig. 3.- Co-location network which checks the associations. 1 - TT, 2 - PA.
Fig. 3.- Grille d'emplacement pour comparer les associations. 1 - TT, 2 - PA.

reveals significantly different values in the edaphic parameters recorded for the proposed association and for the silicicolous associations (Tables IV, V and VI).

Syntaxonomical scheme

Stellarietea mediae Tüxen, Lohmeyer & Preising *ex* von Rochow 1951
Chenopodio-Stellarienea Rivas Goday 1956
Thero-Brometalia (Rivas Goday & Rivas-Martínez *ex* Esteve 1973) O. Bolòs 1975
Taeniathero-Aegilopion geniculatae Rivas-Martínez & Izco 1977
Trifolio cherleri-Taeniatheretum capitis-medusae Rivas-Martínez & Izco 1977
Medicagini rigidulae-Aegilopetum geniculatae Rivas-Martínez & Izco 1977
Plantagini bellardii-Aegilopetum geniculatae nova

Table IV.- Average values of edaphic parameters.
Tableau IV.- Valeurs moyennes des paramètres édaphiques.

	CEC meq/100 g	OMM %	Nt %	Pa p.p.m	Mgc meq/100 g	Kc meq/100 g	pF 15 atm %	Txlmst %	Txsand %	Txsilt %	Sa mmho/cm	pH
Trifolio cherleri-Plantaginetum bellardii	5.217	1.569	0.086	5.263	0.519	0.142	4.791	9.682	75.470	14.869	0.047	6.047
Trifolio cherleri-Taeniatheretum capitis-medusae	9.630	1.458	0.084	5.111	1.097	0.156	6.673	13.588	64.925	21.488	0.049	6.130
Plantagini bellardii-Aegilopetum geniculatae	10.538	1.800	0.136	5.605	1.713	0.206	11.824	25.825	44.980	29.201	0.105	7.581

Table I.- Synthesis of the *Taeniathero-Aegilopion geniculatae* associations under study. 1 - *Trifolio cherleri-Taeniatheretum capitis-medusae* Rivas-Martínez & Izco 1977 (Rivas-Martínez & Izco, 1977, Table 1, rel. 1-27). 2 - *Trifolio cherleri-Taeniatheretum capitis-medusae* Rivas-Martínez & Izco 1977 (rel. 1-20, our own). 3 - *Medicagini rigidulae-Aegilopetum geniculatae* Rivas-Martínez & Izco 1977 (Rivas-Martínez & Izco, 1977, Table 2, rel. 1-15). 4 - *Plantagini bellardii-Aegilopetum geniculatae nova* (rel. 1-20, our own).

Tableau I.- Synthèse des associations du *Taeniathero-Aegilopion geniculatae* étudiées.

Species	1	2	3	4
Taeniatherum caput-medusae	V	V	I	I
Trifolium cherleri	V	III	.	III
Aegilops triuncialis	IV	.	V	IV
Aegilops geniculata	III	.	V	V
Vulpia bromoides	V	.	.	I
Trifolium glomeratum	V	.	.	.
Trifolium strictum	IV	.	.	.
Trifolium arvense	IV	.	.	.
Filago minima	III	.	.	.
Trifolium campestre	III	I	.	II
Trifolium angustifolium	V	.	III	.
Lolium rigidum	IV	.	III	.
Bromus hordeaceus	IV	V	I	.
Convolvulus arvensis	III	.	II	I
Echium plantagineum	III	II	.	.
Avena sterilis	III	.	II	II
Trifolium hirtum	II	.	.	.
Andryala integrifolia	II	.	.	I
Chamaemelum mixtum	II	.	.	II
Crepis foetida	II	.	IV	.
Bromus rubens	I	II	III	.
Petrorhagia nanteuilii	I	.	II	.
Spergularia segetalis	I	.	.	.
Leontodon longirostris	IV	IV	I	I
Eryngium campestre	III	.	.	I
Anthyllis cornicina	II	.	.	.
Cynodon dactylon	II	.	.	III
Carthamus lanatus	I	.	.	I
Agrostis castellana	I	.	.	.
Reseda virgata	I	.	.	.
Dactylis hispanica	I	.	I	.
Hypochaeris glabra	I	.	.	.
Rumex angiocarpus	I	.	.	.
Tolpis umbellata	I	.	.	I
Trifolium gemelum	I	.	.	.
Anthyllis lotoides	I	.	.	.
Astragalus hamosus	.	.	V	.
Medicago rigidula	.	.	V	.
Medicago orbicularis	.	.	III	.
Plantago lagopus	.	II	II	III
Trifolium scabrum	.	.	II	IV
Anacyclus clavatus	.	I	II	.
Scorzonera laciniata	.	.	I	.
Vulpia ciliata	.	.	I	.
Koeleria phleoides	.	.	I	.
Torilis nodosa	.	.	I	.
Medicago minima	.	.	V	III
Filago pyramidata	.	.	II	.
Medicago sativa	.	.	I	.
Brachypodium distachyon	.	II	I	III
Xeranthemum inapertum	.	.	I	.
Sanguisorba minor	.	.	I	.
Coronilla scorpioides	.	.	I	.
Carduus bourgaeanus	.	.	.	I
Crepis vesicaria subsp. *haenseleri*	.	.	.	II
Convulvulus althaeoides	.	.	.	I
Calendula arvensis	.	.	.	I
Bromus madritensis	.	.	.	III
Medicago polymorpha	.	.	.	II
Hordeum leporinum	.	.	.	I
Campanula erinus	.	.	.	I
Stachys arvensis	.	.	.	I
Gastridium ventricosum	.	.	.	I
Centaurea `pullata subsp. *baetica*	.	.	.	I
Galactites tomentosa	.	.	.	II
Hedypnois cretica	.	.	.	II
Sherardia arvensis	.	.	.	II
Euphorbia exigua	.	.	.	II
Scorpiurus muricatus	.	.	.	I
Vulpia geniculata	.	.	.	II
Leontodon taraxacoides	.	.	.	III
Avena fatua	.	.	.	II
Gynandriris sisyrinchium	.	.	.	I
Crepis capillaris	.	.	.	I
Logfia gallica	.	I	.	I
Plantago bellardii	.	I	.	III
Verbascum sinuatum	.	.	.	I
Scabiosa atropurpurea	.	.	.	II
Salvia verbenaca	.	.	.	I
Sanguisorba verrucosa	.	.	.	II
Linum strictum	.	.	.	II
Brachypodium phoenicoides	.	.	.	I
Ajuga iva	.	.	.	I
Pallenis spinosa	.	.	.	I
Anagallis foemina	.	.	.	I
Polygala monspeliaca	.	.	.	I
Valerianella coronata	.	.	.	I
Reichardia intermedia	.	.	.	I
Ajuga iva subsp. *pseudo-iva*	.	.	.	I
Avena barbata subsp. *lusitanica*	.	III	.	.
Coronilla dura	.	I	.	.
Bromus tectorum	.	I	.	.
Erodium cicutarium	.	I	.	.
Bromus rigidus	.	I	.	.
Plantago coronopus	.	II	.	.
Ornithopus compressus	.	II	.	.
Bromus racemosus	.	I	.	.
Brassica barrelieri	.	I	.	.
Rumex bucephalophorus	.	II	.	.
Vulpia myuros	.	III	.	.
Xolantha guttata	.	I	.	.

Table III, Tableau III.- *Trifolio cherleri-Taeniatheretum capitis-medusae* Rivas-Martínez & Izco 1977.

Relevé n°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Altitude (m)	466	353	654	645	681	711	709	718	684	688	716	716	711	622	621	641	649	643	616
Exposure	-	O	SO	O	E	S	-	-	E	E	NE	-	S	O	-	-	O	O	-
Slope %	-	5	3	5	4	3	-	-	5	5	4	-	5	5	-	-	12	8	-
Cover rate %	60	60	75	90	75	95	60	85	75	85	90	100	70	80	80	80%	60	70	60
Area m^2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Alt 1/2 vegetation (cm)	22	15	18	20	20	25	25	15	20	15	20	25	25	20	28	30	20	20	20
Alt 1/2 dominant vegetation (cm)	28	20	24	25	25	30	30	20	40	20	30	35	30	25	35	40	25	25	25
Characteristic of the ass. and higher units																			
Taeniantherum caput-medusae	3	2	3	3	3	3	3	4	3	4	4	5	3	4	4	4	3	3	3
Trifolium cherleri	-	2	1	1	+	1	3	-	3	2	-	-	-	-	-	+	1	2	1
Bromus hordeaceus	2	-	3	2	2	2	2	3	1	2	1	-	3	2	1	3	1	2	2
Leontodon longirostris	+	+	+	-	1	1	-	1	2	1	-	2	1	1	-	+	1	1	-
Vulpia myuros	2	2	-	-	1	-	2	-	1	-	-	2	-	1	2	1	2	1	+
Avena barbata subsp. *lusitanica*	-	-	1	-	1	2	1	+	+	-	+	+	2	-	+	-	+	2	-
Plantago lagopus	+	-	1	1	2	-	2	1	-	2	-	-	-	2	1	-	-	-	1
Bromus tectorum	-	3	-	4	-	5	-	2	-	-	-	-	-	-	-	-	-	-	-
Echium plantagineum	+	-	-	-	1	1	+	+	-	-	-	-	-	2	1	+	-	-	+
Briza maxima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Crepis vesicaria subsp. *haenseleri*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Calendula arvensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+
Bromus madritensis	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Anagallis arvensis	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium parisiense	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum leporinum	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erodium moschatum	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Bromus diandrus	-	-	-	-	+	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Plantago lanceolata	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Lupinus luteus	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedypnois cretica	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-
Bromus rigidus	-	-	-	-	-	-	+	-	-	-	-	1	-	-	1	+	-	1	1
Erodium aethiopicum subsp. *pilosum*	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Geranium molle	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Senecio vulgaris	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Rumex acetosella subp. *angiocarpus*	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Erodium cicutarium	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-
Trifolium campestre	-	+	-	-	+	-	-	-	+	-	+	-	1	-	-	1	-	-	-
Anacyclus clavatus	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	+
Lathyrus angulatus	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromus racemosus	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	+	-	-	-
Crepis capillaris	-	-	-	-	-	-	-	-	-	-	-	+	-	2	1	-	-	-	-
Brassica barrelieri	1	+	1	+	-	1	1	-	-	-	-	-	-	+	-	-	-	+	-
Linaria viscosa	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Spergularia rubra subsp. *longipes*	-	1	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Muscari comosum	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthyllis lotoides	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Rumex bucephalophorus	-	1	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
Trifolium arvense	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrorhagia nanteuilii	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Teesdalia coronopifolia	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Linum tenue	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parentucellia latifolia	-	-	+	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tolpis umbellata	-	-	-	-	-	-	-	-	-	-	-	+	-	1	-	-	-	-	-
Petrorhagia velutina	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypochaeris achyrophorus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	1	-
Trifolium stellatum	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	1
Linum trigynum	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Chamaemelum mixtum	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Vulpia ciliata	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Ornithopus compressus	-	3	2	1	-	1	+	-	+	-	-	-	-	-	-	-	-	-	+
Linum bienne	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Andryala integrifolia	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Companions																			
Sanguisorba minor	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Cerastium glomeratum	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Euphorbia falcata	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brachypodium distachyon	-	-	-	-	-	-	-	-	2	2	2	1	2	-	+	-	+	-	-
Poa bulbosa	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Hypochaeris glabra	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Logfia gallica	-	1	-	-	-	-	-	-	-	+	-	1	-	-	-	-	-	-	-
Plantago bellardii	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-
Campanula lusitanica	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tuberaria guttata	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Coronilla dura	-	-	-	-	-	-	-	-	+	-	1	-	+	-	-	-	-	-	-
Biserrula pelecinus	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Plantago coronopus	+	1	+	1	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-
Gaudinia fragilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Briza minor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Serapias lingua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-

Sites with UTM in 30S (Spain) - Castellones San Miguel (sierra Morena), rel. 1 (0413829/4220782). Clima up to Santuario (sierra Morena), rel. 2 (0411212/4224695). Santuario-Puertollano (Sierra Morena), rel. 3 (0409550/4229438), rel. 4 (0409493/4229452), rel. 5 (0409519/4230577), rel. 6 (0408895/4230714), rel. 7 (0408790/4230714). La Navarra (sierra Morena), rel. 8 (0407339/4231726). Near Monte Rosalejo (sierra Morena), rel. 9 (0406612/4234467), rel. 10 (0406620/4234522). El Tamujar (sierra Morena), rel. 11 (0405450/4236938). Road to Valdelagrana (sierra Morena), rel. 12 (0404245/4240630), rel. 13 (0404161/4240613). Los Escoriales (sierra Morena), rel. 14 (0418167/4224327), rel. 15 (0418199/4224335), rel. 16 (0417937/4224816), rel. 17 (0418013/4225228), rel. 18 (0418751/4225058), rel. 19 (0418527/4225525).

Table II, Tableau II.- *Plantagini bellardii-Aegilopetum geniculatae nova.*

Relevé n°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Altitude (m)	241	440	442	473	493	490	410	407	414	363	233	254	299	303	256	254	425	427	445	445	435
Exposure	-	-	-	-	-	-	-	-	-	-	-	-	-	SE	-	-	N	-	-	-	-
Slope	-	-	-	-	-	-	-	-	-	-	-	-	-	3%	-	-	3%	-	-	-	-
Cover rate %	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Area m^2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Alt 1/2 veg (cm)	30	18	15	20	20	25	20	25	18	35	20	25	20	20	20	30	15	15	15	15	10
Alt 1/2 dominant veg (cm)	40	22	20	25	25	30	25	30	20	40	30	30	25	25	30	40	20	20	20	20	15
Characteristic of the ass. and higher units																					
Aegilops geniculata	4	4	4	4	4	4	2	4	4	3	4	5	4	4	5	5	4	4	5	4	5
Trifolium stellatum	-	2	2	3	2	2	2	2	1	-	1	1	1	2	-	-	2	+	2	1	1
Plantago lagopus	1	-	+	1	-	-	1	1	-	+	1	-	1	-	-	-	+	1	1	+	1
Medicago minima	-	1	2	1	2	2	2	2	-	-	1	1	1	1	-	-	+	-	-	-	1
Plantago bellardii	-	1	1	1	1	2	1	1	-	-	-	+	+	+	-	-	+	+	-	1	+
Aegilops triuncialis	-	2	2	2	2	2	3	2	-	4	2	2	1	1	+	+	-	2	+	-	1
Trifolium scabrum	-	+	+	1	-	1	1	1	-	-	1	-	+	1	1	-	2	1	2	1	2
Medicago truncatula	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leontodon taraxacoides	-	+	1	-	1	1	1	-	+	1	+	1	1	+	-	1	-	-	+	+	-
Echium plantagineum	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-
Medicago polymorpha subsp. *p.*	-	-	-	1	-	-	-	+	-	1	-	-	-	+	+	-	+	1	1	-	-
Medicago doliata var. *muriata*	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-
Medicago rigidula	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gastridium ventricosum	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Medicago orbicularis	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Geranium molle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Leontodon longirostris	1	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	1	-	-	+
Vulpia geniculata	-	-	-	1	1	1	-	1	1	1	-	-	-	+	-	-	+	-	-	-	-
Trifolium campestre	-	-	+	+	+	+	-	-	-	-	-	-	-	+	-	-	+	-	1	+	-
Trifolium cherleri	1	-	+	+	-	-	-	-	-	-	1	-	+	+	1	+	1	1	1	1	1
Anthyllis lotoides	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Hypochaeris glabra	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Logfia gallica	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
Petrorhagia nanteuilii	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Euphorbia falcata	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-
Tolpis umbellata	-	-	+	-	-	1	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-
Taeniatherum caput-medusae	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	+	-	-
Chamaemelum mixtum	-	-	-	+	-	+	-	-	1	-	-	-	+	+	-	-	-	+	-	+	+
Andryala integrifolia	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	+	-	-	+
Linum bienne	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Briza maxima	-	-	-	-	-	+	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-
Plantago afra	-	1	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Trifolium angustifolium	+	1	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medicago ciliaris	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aegilops neglecta	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medicago tornata	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Stipa capensis	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Rapistrum rugosum	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-
Diplotaxis catholica	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepis vesicaria subsp. *haens.*	1	-	1	1	1	1	+	-	-	1	+	-	+	+	+	-	-	-	+	-	-
Bellardia trixago	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedypnois cretica	1	1	2	-	2	-	1	1	2	1	1	1	1	1	+	1	-	1	+	-	1
Calendula arvensis	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	+	+	-	-
Bromus madritensis	-	+	+	-	-	1	1	1	-	-	+	-	1	1	-	-	-	-	+	-	+
Anagallis arvensis	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Papaver rhoeas	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Galium parisiense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Avena barbata subsp. *b.*	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum leporinum	-	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	+	-	-
Lolium rigidum	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	+	-	-	-
Chrysanthemum segetum	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Stachys arvensis	-	-	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-
Sonchus asper subsp. *a.*	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Silene vulgaris	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Urospermum picroides	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
Avena sterilis subsp. *s.*	2	-	1	+	-	1	1	-	-	-	-	1	1	1	-	-	-	-	-	-	-
Trifolium tomentosum	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vicia benghalensis	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Centaurea pullata subsp. *baetica*	-	-	-	(+)	-	-	+	-	1	+	+	-	-	-	-	-	-	-	-	+	-
Galactites tomentosa	+	-	-	-	-	-	-	-	-	-	+	+	1	-	-	+	-	+	+	-	+
Erodium botrys	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sherardia arvensis	-	+	-	-	1	+	+	-	1	+	1	-	-	+	+	-	-	-	-	-	-
Bromus sterilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Bromus rigidus	-	-	+	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lupinus angustifolius	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rumex acetosella subp. *angioc.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Misopates orontium	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Scorpiurus vermiculatus	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Chamaemelum fuscatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	+	-
Scorpiurus muricatus	-	-	-	1	-	-	-	-	-	-	1	+	-	-	-	-	-	+	-	-	+
Astragalus cymbicarpos	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Papaver hybridum	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Bromus hordeaceus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	+	-
Jasione montana subsp. *bleph.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Bromus rubens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Biscutella auriculata	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
Convolvulus arvensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+
Filago lutescens	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Valerianella discoidea	-	+	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avena fatua	1	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	+	1	+	1
Raphanus raphanistrum subsp. *microcarpus*	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Linum strictum	-	+	1	-	1	1	+	1	-	-	-	2	-	-	-	-	-	-	-	2	-
Vulpia bromoides	-	1	-	-	-	1	1	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Papaver dubium	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Valerianella coronata	-	-	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Bunias erucago	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nigella damascena	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Centranthus calcitrapae	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Cynosurus echinatus	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Tragopogon porrifolius	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-
Scorzonera angustifolia	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Ornithogalum narbonense	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-
Richardia intermedia	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	+
Companions																					
Cynodon dactylon	+	-	+	1	1	1	-	+	-	1	1	1	-	1	+	+	+	-	-	+	+

Carduus bourgaeanus	-	-	-	+	-	-	1	1	-	-	-	-	-	+	-	-	-	+	-	-	+
Brachypodium distachyon	-	2	1	2	3	2	3	-	-	-	-	3	2	3	1	-	2	2	-	1	1
Convolvulus althaeoides	-	+	-	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-
Foeniculum vulgare	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-
Campanula erinus	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	+	2	-
Dactylis glomerata var. *hisp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Euphorbia exigua	-	+	-	-	+	+	-	-	-	-	-	+	-	-	-	-	+	+	-	+	1
Carthamus lanatus	-	-	-	1	-	-	1	-	-	-	+	-	-	-	-	-	-	-	+	-	+
Plantago coronopus	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Daucus carota subsp *c.*	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cynara humilis	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Eryngium campestre	-	-	-	-	-	-	-	-	1	-	-	-	+	-	+	-	-	-	+	-	-
Paronychia argentea	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Gynandridis sisyrinchium	-	-	+	-	-	-	-	-	-	-	+	-	+	+	-	+	-	-	-	-	-
Trifolium subterraneum	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crepis capillaris	-	-	-	-	+	+	-	-	+	-	-	-	-	1	-	+	-	-	-	-	-
Dactylis lusitanica	1	1	-	+	+	+	+	+	-	+	+	-	+	+	-	-	+	+	+	-	+
Hypericum perforatum	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carlina racemosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Tolpis barbata	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Gladiolus illyricus	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cichorium intybus	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Verbascum sinuatum	-	+	-	+	+	-	-	-	2	-	-	-	-	-	-	-	+	-	-	-	-
Scolymus hispanicus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	+	-	-
Herniaria lusitanica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Chondrilla juncea	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scabiosa atropurpurea	-	+	+	-	+	-	-	-	-	-	-	+	-	-	1	-	-	-	-	+	+
Salvia verbenaca	-	+	-	+	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Sanguisorba verrucosa	-	+	+	-	+	+	-	-	-	+	-	+	-	+	-	+	-	-	-	-	-
Brachypodium phoenicoides	-	+	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
Ajuga iva	-	+	+	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-
Reichardia picroides	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atractylis cancellata	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pallenis spinosa	-	-	+	-	-	-	+	-	-	-	+	+	-	-	-	-	-	1	-	-	+
Anagallis foemina	-	-	1	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Anagallis monelli	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Centaurium erythraea	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Polygala monspeliaca	-	-	-	-	+	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Iris xiphium	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Velezia rigida	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Daucus crinitus	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Carlina corymbosa	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
Ajuga iva subsp. *pseudo-iva*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	+	-	-	-	-
Anarrhinum bellidifolium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Hypericum tomentosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	+
Achillea ageratum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Asteriscus aquaticus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+

Sites with UTM in 29S (Portugal) - Near Señora de Machede, rel. 1 (0605406/4271348). Between Benatell-Villa Vicosa, rel. 2 (0636059/429137), rel. 3 0636089/4291656). Between the Muiñhos River and Borba, rel. 4 (0632596/4294123). Near Borba, rel. 5 (0632951/429430), rel. 6 (0632858/4294313). Road between ria of Moinha-Estremoz, rel. 7 (0631116/4293560), rel. 8 (0631147/4293540). Mora, rel. 9 (0629170/4293570). Ilhas-Arraiolos, rel. 10 (0588925/4285769). Between Cano and Sousel, rel. 11 (0605826/4312676). Between Cano and Estremoz, rel. 12 (0609518/4311375). 4 km south of Sousel, rel. 13 (0615480/4310230), rel. 14 (0615448/4310237). Crossroads Évora-Estremoz, rel. 15 (0614168/4294779), rel. 16 (0615522/4295985). Exit to Estremoz-Portalegre, rel. 17 (0623303/4301744). Estremoz in the direction of Orada, rel. 18 (0623826/4301930). Orada-Santo Aleixo (Estremoz), rel. 19 (0627976/4299854). Estremoz-Elvas (in the direction of Moinha), rel. 20 (0631924/4297253). Road to Moinhos, rel. 21 (0631708/4297154).

Table V.- Données édaphiques sur le *Trifolio cherleri-Taeniatheretum capitis-medusae* Rivas-Martínez & Izco 1977.
Tableau V.- Edaphic data on *Trifolio cherleri-Taeniatheretum capitis-medusae* Rivas-Martínez & Izco 1977.

Order no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Field no.	169	170	171	173	174	177	179	186	187	188	190	191	192	193	195	198	200	203	205
CEC (meq/100 g)	20.435	6.087	15.652	7.826	7.391	4.783	5.652	6.957	13.913	13.043	17.391	18.696	7.826	8.261	5.652	3.478	6.087	5.652	10
Carbonates (%)	3.6	1.2	1.8	1	1	0	1.7	1.5	2.2	1.7	2	1	1.5	1.7	1.7	2.2	2.2	1.9	1.5
Ca (meq/100 g)	10.801	8.498	11.392	7.4	9.521	5.414	7.48	12.063	6.395	9.184	11.851	6.462	5.554	6.771	4.45	6.958	10.107	6.539	16.739
Assimilable P (p.p.m)	2	2	6	5	16	39	1	8	2	1	2	1	1	1	1	0.15	1	1	2
Mg (meq/100 g)	1.624	1.62	0.589	0.413	1.534	0.339	0.393	0.457	1.484	2.076	4.095	1.801	0.842	0.663	0.35	0.5	0.975	0.786	0.745
OMM (%)	1.45	0.29	1.06	1.49	1.36	0.96	1.56	1.63	2.04	1.58	2.35	1.87	1.78	1.2	1.11	0.59	1.15	1.24	2.15
N (%)	0.085	0.025	0.067	0.092	0.075	0.058	0.092	0.093	0.137	0.081	0.147	0.139	0.11	0.074	0.066	0.028	0.056	0.069	0.105
pH 1/2.5	6.6	6.5	6.6	6	5.7	6.4	6.3	6.6	5.9	5.9	5.6	5.6	5.8	6.3	6	6.1	6.1	5.9	6.3
K (meq/100 g)	0.082	0.113	0.164	0.107	0.125	0.228	0.12	0.184	0.136	0.102	0.207	0.115	0.123	0.179	0.207	0.064	0.153	0.095	0.307
pF 1/3 atm (%)	15.73	10.26	13.68	15.08	13.96	11.43	12.98	14.54	25.72	27.69	32.94	22.13	15.6	14.13	15.12	11.04	16.5	13.8	18.4
pF 15 atm (%)	6.44	3.7	5	5.57	6.53	3.54	4.876	5.26	12.14	10.94	17.23	9.4	5.98	4.71	5.72	4.04	5.56	4.61	6.56
Tx limestone (%)	11.3	7.4	9.55	8.75	11.25	6.7	8.5	7.2	15.85	13.85	29.8	26.45	14.25	10.35	7.4	15.35	19.15	15.75	13.75
Tx sand (%)	72.52	82.13	73.06	74.12	70.15	79.08	73.18	76.8	32.6	35.98	26.28	25.62	56.06	72.82	73.7	74.85	73.53	79.9	72.54
Tx silt (%)	16.18	10.47	17.39	17.13	18.6	14.22	18.32	16	51.55	50.17	43.93	47.93	29.69	16.83	18.9	9.8	7.32	4.35	13.7
Sieve 2mm (%)	10.9	13.78	21.45	38.9	19.32	14.08	17.17	11.35	36.31	30.12	44.04	19.78	16.45	11.46	9.57	10.72	8.28	16.86	25.93
Salinity (mmhos/cm)	0.06	0.04	0.06	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.06

Table VI.- Données édaphiques sur le *Plantagini bellardii-Aegilopetum geniculatae nova.*
Tableau VI.- Edaphic data on *Plantagini bellardii-Aegilopetum geniculatae nova.*

Order no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Field no.	169	170	171	173	174	177	179	186	187	188	190	191	192	193	195	198	200	203	205	77	79
CEC (meq/100 g)	6.086	9.565	8.696	9.13	8.696	8.696	12.609	14.783	8.696	9.13	13.478	17.391	12.174	9.13	6.087	5.652	11.304	11.739	14.783	10	13.478
Carbonates (%)	2.5	0	1	1	0	0	1	0	21.4	0	39.1	0.9	0.2	0.7	0	0	1.8	1.6	1.6	1.7	1
Ca (meq/100 g)	11.09														19.643	10.744	25.324	17.737	27.52	10.49	17.595
Assimilable P (p.p.m)	2	1	4	28	32	1	2	3	1	2	2	3	3	2	3	1.7	2	3	7	4	11
Mg (meq/100 g)	0.706	3.326	0.577	0.836	0.908	0.484	1.273	1.638	0.714	2.196	1.493	1.785	1.299	1.558	0.783	1.388	2.225	3.113	4.992	2.086	2.59
OMM (%)	1.04	2.02	1.02	1.205	1.75	1.58	2.06	2.7	1.71	0.88	2.38	1.75	2.57	1.97	1.53	1.12	1.78	2.11	2.96	2.48	1.18
N (%)	0.014	0.17	0.103	0.11	0.185	0.143	0.147	0.215	0.168	0.094	0.128	0.116	0.161	0.129	0.092	0.1	0.136	0.149	0.178	0.166	0.152
pH 1/2.5	7	7.9	8.2	7.9	7.7	7.6	7.8	7.3	8.2	7.2	8.2	8	7	7.2	7.5	6.7	7.6	7.6	7.4	7.8	7.4
K (meq/100 g)	0.136	0.159	0.171	0.307	0.205	0.115	0.189	0.358	0.097	0.084	0.358	0.256	0.205	0.143	0.1	0.069	0.153	0.156	0.665	0.166	0.228
pF 1/3 atm (%)	13.93	24.38	18.25	22.98	19.86	19.95	20.86	21.91	22.01	16.19	26.3	23.51	21.85	20.94	17.73	25.65	23.61	20.6	26.93	25.02	21.7
pF 15 atm (%)	5	11.1	11.44	9.42	9.41	9.7	14.23	15.24	20.47	7.13	13.12	15.18	11.86	9.41	7.34	9.29	10.89	12.13	19.02	12.85	14.08
Tx limestone (%)	17.8	24.4	26.3	29.1	16.3	21.8	43.2	28.5	29.9	6.8	33.9	45.6	33.22	24.55	11.75	16	16.3	25.1	44.1	22.3	25.4
Tx sand (%)	73.78	37.9	35.6	26.5	51.7	47.8	33.3	44.9	42.5	62	35.81	37.94	49.62	55.09	62.1	33.24	44.52	41.85	33.08	47.82	47.53
Tx silt (%)	8.42	37.7	38.2	44.5	32	30.4	23.5	26.6	27.5	31.2	30.29	16.46	17.18	20.36	26.15	50.76	39.18	33.05	22.82	29.88	27.07
Sieve 2mm (%)	6.97	24.1	21.1	35.49	28.3	26.81	43.02	38.55	27.25	19.99	20.74	45.58	35.55	31.38	43.01	28.83	34.93	36	37.52	35	37.8
Salinity (mmhos/cm)	0.09	0.1	0.16	0.11	0.08	0.06	0.11	0.06	0.16	0.11	0.17	0.12	0.07	0.07	0.13	0.09	0.11	0.08	0.11	0.13	0.08

REFERENCES

Braun Blanquet J., 1979.- *Fitosociología. Bases para el estudio de las comunidades vegetales.* H. Blume, 820 p.

Cano E. & A. García-Fuentes, 1994.- Estado actual de la clase *Ruderali-Secalietea cereales* Br.-Bl. 1936 en el sur de la Península Ibérica (Andalucía, España). *Monogr. Fl. Veg. Béticas*, **7-8**, 35-76.

Cano E., A. García-Fuentes, J.A. Torres, & C. Salazar, 1998.- Vegetación de las intercalaciones calcáreas de sierra Morena (Andalucía, España). *Fitosociología*, **35**, 13-26.

Cano-Ortiz A., 2007.- *Bioindicadores ecológicos y manejo de cubiertas vegetales como herramienta para la implantación de una agricultura ecológica.* Tesis Doctoral, Universidad de Jaén, 362 p.

Cano-Ortiz A., C.J. Pinto-Gomes, F.J. Esteban Ruiz, A. Rodríguez-Torres, J. Goñi, I. De la Haza & E. Cano, 2009.- Biodiversity of *Hordeion leporini* in Portugal: a phytosociological and edaphic analysis. *Acta Bot. Gallica*, **156** (1), 33-49.

Castroviejo S. *et al.* (eds), 2001.- *Claves de Flora Ibérica.* CSIC, 774 p.

García-Fuentes A., J.A. Torres, C. Salazar & E. Cano, 2000.- Estudio fitosociológico de la alianza *Taeniathero-Aegilopion geniculatae* y valor pascícola en la provincia de Jaén (España). *Stud. Bot*, **19**, 39-56.

Pereira Coutinho A.X., 1939.- *Flora de Portugal (plantas vasculares).* Bertrand, Lisboa, 938 p.

Pinto Gomes C.J. & J.J. Lazare, 2002.- La végétation du centre et du sud du Portugal : guide de voyage botanique. *J. Bot. Soc. Bot. France*, **17**, 1-89.

Pinto-Gomes C.J. & R. Paiva-Ferreira, 2005.- *Flora e vegetaçao do Barrocal Algarvo (Tavira-Portimao).* Ed. Comissao do Coordenaçao e Desenvolvimento Regional do Algarve, Évora, 354 p.

Rivas-Martínez S., 2007.- Mapa de series, geoseries y geopermaseries de vegetación de España. Memoria del mapa de vegetación potencial de España, I. *Itin. Geobot.*, **17**, 1-435.

Rivas-Martínez S., F. Fernández-González, J. Loidi, M. Lousa & A. Penas, 2001.- Syntaxonomical checklist of vascular plant communities of Spain and Portugal to association level. *Itin. Geobot.* **14**, 1-341.

Rivas-Martínez S & J. Izco, 1977.- Sobre la vegetación terofítica subnitrófila mediterránea (*Brometalia rubenti-tectori*). *Anales Inst. Bot. Cavanilles*, **34** (1), 355-381.

Rivas-Martínez S. & J. Loidi, 1999a.- Bioclimatology of the Iberian Peninsula. *Itin. Geobot.*, **13**, 41-47.

Rivas-Martínez S. & J. Loidi, 1999b.- Biogeography of the Iberian Peninsula. *Itin. Geobot.*, **13**, 49-67.

Santos Mª T., M. Ladero, & A. Amor, 1989.- Vegetación de las intercalaciones básicas de la provincia de Cáceres (Extremadura, España). *Studia Bot*, **7**, 9-147.

Tutin T., V.H. Heywood, D.A. Burges, D.H. Valentine, S.M. Walters & D.A. Webb (eds), 1964-80.- *Flora Europaea*, I-IV, Cambrige University Press.

Valdés B., S. Talavera & E. Fernández-Galiano, 1987.- *Flora Vascular de Andalucía Occidental.* Ketres, 1-3, Barcelona.