

STEPPE-LIKE GRASSLAND VEGETATION IN THE HILLS AROUND THE LAKES OF VEGORITIDA AND PETRON, NORTH-CENTRAL GREECE

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Abstract

The present paper describes the floristic composition and synecology of steppe-like dry grasslands occurring in a Natura 2000 site in North-Central Greece around the two karstic lakes of Vegoritida and Petron. In total, 245 relevés of vascular plant species composition and abundance were sampled and subjected to cluster analysis and ordination analysis. Passive explanatory variables, including environmental parameters as well as indicator values, were used to support the ecological interpretation. Four plant communities were distinguished in the area, namely *Artemisia campestris-Dasyphyrum villosum*, *Chrysopogon gryllus-Bothriochloa ischaemum*, *Satureja montana-Artemisia alba* and *Stipa capillata-Koeleria macrantha*. All communities were classified within the *Festuco-Brometea* class and the *Astragalo-Potentilletalia* order. Soil properties (soil reaction, moisture and nutrient content) and meso-climate factors (temperature variation along topographic gradients) were identified as the main factors determining the floristic differentiation among the four communities.

The dry grasslands harbor a number of species associated with steppic habitats. We discuss the relict character of the steppe-like vegetation.

Key words: *Astragalo-Potentilletalia*, dry calcareous grasslands, *Festuco-Brometea*, steppe plants, syntaxonomy, vegetation classification.

Izveček

V članku opisujemo floristično sestavo in sinekologijo stepi podobnih suhih travnišč, ki se pojavljajo v Natura 2000 območju v severni centralni Grčiji okoli dveh kraških jezer Vegoritida in Petron. Vzorčili smo 245 vegetacijskih popisov in jih analizirali s klastersko in ordinacijsko analizo. Rastišče smo interpretirali s pasivnimi pojasnjevalnimi spremenljivkami, kamor smo vključili okoljske spremenljivke in indikatorske vrednosti. Na raziskovanem območju smo ločili štiri rastlinske združbe: *Artemisia campestris-Dasyphyrum villosum*, *Chrysopogon gryllus-Bothriochloa ischaemum*, *Satureja montana-Artemisia alba* in *Stipa capillata-Koeleria macrantha*. Vse združbe smo uvrstili v razred *Festuco-Brometea* in red *Astragalo-Potentilletalia*. Lastnosti tal (reakcija tal) in mezo klimatski dejavniki (spreminjanje temperature vzdolž topografskih gradientov) so glavni dejavniki, ki vplivajo na floristične razlike med štirimi rastlinskimi združbami.

V suhih travniških najdemo številne vrste stepskih habitatov. V članku razpravljamo o reliktnem značaju stepi podobne vegetacije.

Ključne besede: *Astragalo-Potentilletalia*, suha travnišča na apnencu, *Festuco-Brometea*, stepske rastline, sintaksonomija, klasifikacija vegetacije.

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1. INTRODUCTION

In the natural landscape of Europe, calcareous grasslands below the timberline would have occurred on steep outcrops in mountainous regions, on non-forested hilltops characterized by extreme environmental conditions, and in continental lowland steppes (Butaye et al. 2005). Today, nearly all low to montane calcareous grasslands are semi-natural, anthropogenic vegetation that replaces various kinds of forest on lime-rich bedrock and mostly shallow or permeable soils (Poschlod & WallisDe Vries 2002, Rodwell et al. 2007). While in central and western Europe numerous publications deal with the syntaxonomy of dry grasslands (e.g. Oberdorfer & Korneck 1978, Royer 1991, Bruun & Ejrnaes 2000, Price 2002, Rodwell et al. 2002, Dengler et al. 2006, Dengler & Löbel 2006, Illyés et al. 2007, Micháľková 2007), publications concerning dry grasslands in the Balkans have appeared mainly in the last decade (e.g. Redžić 1999, Dring et al. 2002, Meshinev et al. 2005, Apostolova & Meshinev 2006, Matevski et al. 2008, Tzonev 2009, Tzonev et al. 2009, Todorova & Tzonev 2010, Čušterevska et al. 2012, Vassilev et al. 2012). Studies on the grassland vegetation of Greece refer chiefly to high-altitude grasslands (Bergmeier 1990, 2002, Karagiannakidou et al. 1995, Schreiber 1998, Papanastasis et al. 2003), while the lowland and montane grassland vegetation has been scarcely studied as yet (but see Pirini & Babalonas 2002, Pirini et al. 2006, Bergmeier et al. 2009, Pirini 2011).

In North-Central Greece, dry calcareous grasslands of lower elevations physiognomically resemble steppe grasslands (Pirini 2011). However, we refer to the original meaning of zonal semi-arid grasslands of the nemoral (temperate and submeridional) vegetation zone as emphasized by, e.g., Walter (1974) and Schroeder (1998). Steppe occurs as zonal vegetation in south-eastern Europe, the Ukraine, southern Russia and Central Asia (Martinovsky & Kolbek 1984, Schroeder 1998), while the corresponding vegetation of the Balkans is considered secondary, steppe-like grassland, with some species interpreted as relicts of the Tertiary period (Horvat et al. 1974, Ellenberg 1988, Zgaga 2005).

The present paper describes the floristic composition and the underlying gradients of steppe-like grassland vegetation around the two karstic lakes of Vegoritida and Petron in North-Central Greece, thus contributing to a better under-

standing of the low-altitude dry grasslands near the south-eastern European margins of the vegetation class *Festuco-Brometea* (see Dengler et al. 2013). The phytosociological investigation and ecological interpretation provides a basis for the appropriate management and conservation of the steppe-like grasslands and their species.

2. MATERIAL AND METHODS

2.1. STUDY AREA

The study area is located in North-Central Greece (Figure 1), between the coordinates 40° 49' to 40° 39' N and 21° 40' to 21° 50' E. It includes a complex of two karstic lakes (Vegoritida and Petron) in a total area of 12,077 ha, with an altitudinal range of 510 to 850 m. The study area is a Natura 2000 site (GR-1340004, Limnes Vegoritida-Petron).

The climate of the area is submediterranean-subcontinental, characterized by harsh winters and mild drought in summers, with a mean annual precipitation of 437 mm (rain only, without snowfall) according to data from the meteorological station of Amindeo (longitude: 21° 41', latitude: 40° 41', altitude: 580m) for the period 1964–2008. Based on the Mediterranean bioclimatic divisions, the area belongs to the sub-humid zone with harsh winters (Emberger 1955, Mavromatis 1980). The dry period, according to the ombro-thermic diagram of Bagnouls & Gaussen (1957), lasts four months, from early June to late September.

Geomorphologically, the study area is part of a long graben system that opened in the late Miocene. It was divided by ridges and hills into several sub-basins during the Pleistocene (Pavlidis & Mountrakis 1987, Goldsworthy & Jackson 2001). The rocks of the sub-basins and the surrounding hills belong to the north Pelagonian geological zone and consist of crystalline limestones and marbles, recent talus cones and screes at the foothills, while recent alluvial and lacustrine deposits occur around the lakes (Pavlidis & Mountrakis 1987).

2.2. DATA RECORDING AND ANALYSIS

In total, 245 relevés were sampled during the years 1999 to 2001 and 2003 to 2005, according to the Braun-Blanquet method (Braun-Blanquet 1964, Dierschke 1994). The plot size was between 20 and 50 m². In each relevé, the altitude, expo-

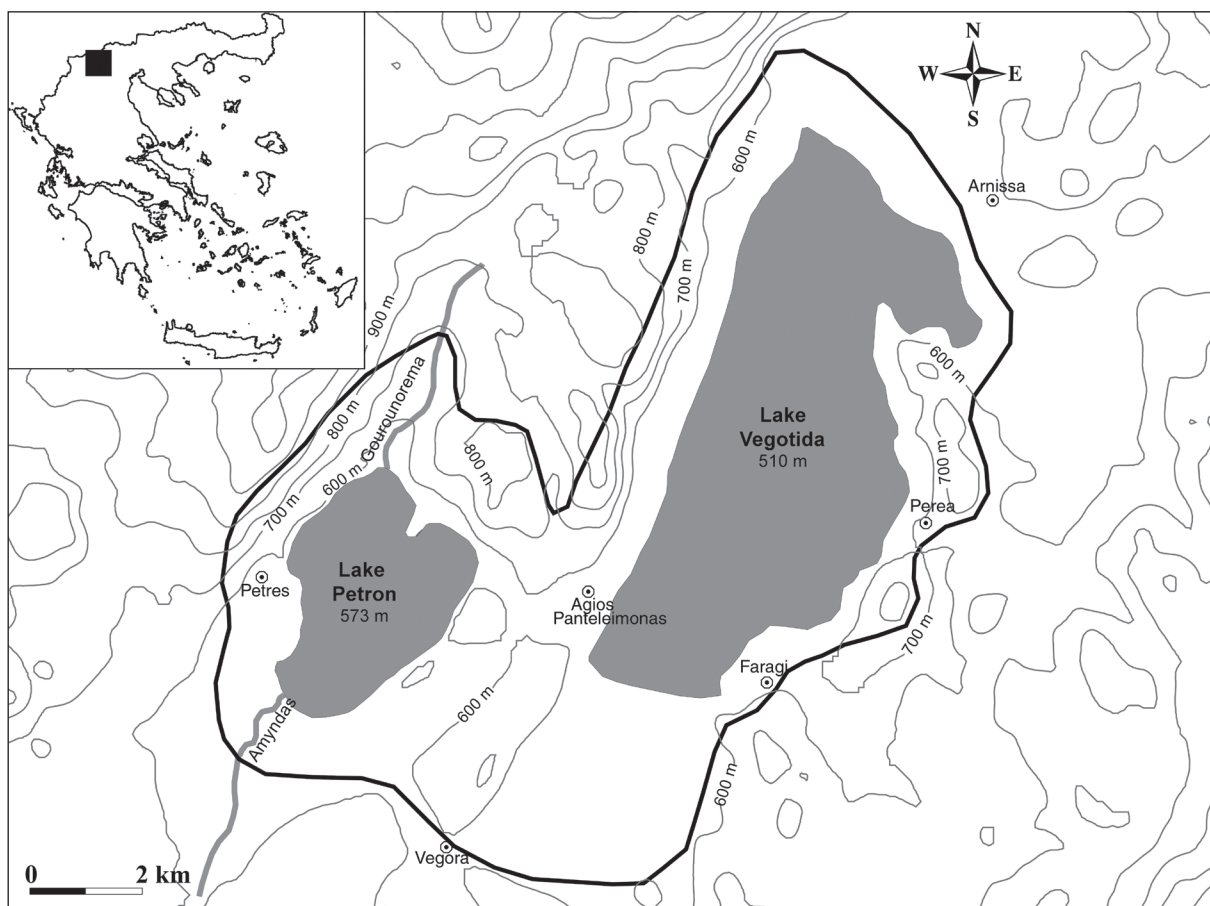


Figure 1: Map of the study area.

Slika 1: Karta raziskovanega območja.

sition and slope were measured. Coordinates of relevés were recorded using GPS. Species cover/abundance was estimated using the 7-point Braun-Blanquet scale (Braun-Blanquet 1964).

Both multivariate classification and ordination techniques were applied. Vegetation data were entered into a database implemented in TURBOVEG version 2.32a (Hennekens & Schaminée 2001). The phytosociological table was processed in JUICE version 6.3 (Tichý 2002). Taxa occurring in only one or two relevés were omitted prior to analyses in order to reduce noise. For the classification of relevés, cluster analysis was performed using the Sørensen distance and the flexible beta method, setting the b value equal to -0.25. Classification was carried out using PC-ORD (ver. 5) (McCune & Mefford 1999). Detrended Correspondence Analysis (DCA; Hill & Gauch 1980) was used for ordination with CANOCO (ver. 4.5) (ter Braak & Šmilauer 2002). Species abundances were squared-root transformed prior to DCA

analysis. In order to facilitate the interpretation of the DCA diagram, passive explanatory variables were used. These variables concern altitude, inclination, geographical coordinates, potential annual direct incident radiation and heat load, and the Ellenberg indicator values for the relevés. Geographical coordinates were transformed to X and Y coordinates from a zero point. Potential annual direct incident radiation and heat load were calculated using the third equation from McCune & Keon (2002). Ellenberg indicator values (IVs) of the taxa concern light, temperature, continentality, moisture, reaction, nitrogen and salinity. The indicator values were taken from the list referring to the flora of Italy (Pignatti et al. 2005, extended by Pignatti during the 16th Workshop of the European Vegetation Survey in 2006). In total, 212 out of the 265 taxa of the data set were present in the extended list of Pignatti et al. (2005). For the 52 taxa not present, new indicator values were calculated in JUICE (Tichý

2002) using the phi coefficient (Chytrý et al. 2002). Taxa with a phi coefficient higher or equal to 0.2 were identified for each of the 52 taxa with missing values, and the mean of their indicator values was taken as the new indicator value. The calculation of the indicator values was not possible for one taxon, because there were no taxa with a phi coefficient higher or equal to 0.2 with regard to this taxon. The indicator values of the relevés were calculated as a weighted mean of the indicator values of taxa occurring in them. The weighting was calculated based on the cover values of each taxon, which were transformed into percentage values and then power transformed, using as power the value 0.2. In this way, the abundance of taxa was taken into account, but sufficiently downweighted to reduce the effect of species dominance on the indicator values of the relevés. Correlations between DCA relevé scores and explanatory variables were calculated using the non-parametric Kendall coefficient.

Differential taxa combinations for the distinguished plant communities were determined using the algorithm proposed by Tsiripidis et al. (2009). Furthermore, in order to quantify the fidelity values of taxa, the phi-coefficient was calculated between the groups differentiated positively and those differentiated negatively, positive-negatively or not-differentiated at all. As fidelity threshold to accept a taxon as differential for a group or a combination of groups, the value 0.45 was chosen.

The nomenclature of the taxa in the phytosociological tables and the text follows Dimopoulos et al. (2013).

3. RESULTS AND DISCUSSION

3.1 CLASSIFICATION AND SYNTAXONOMY

The cluster analysis of the relevés revealed four groups corresponding to ecologically interpretable plant communities (Table 1):

1. The first group, the *Artemisia campestris-Dasyphyrum villosum* community (Table 6), includes all relevés sampled at the bottom of hills, on gravelly soil formed by the erosion of the calcareous bedrock uphill. The soils are relatively nutrient-rich, especially on sites of former arable fields and near roads, where human impact affects the species composition of the vegetation. Vegetation dominated by *Artemisia campestris*

is found in dry, base-rich grasslands throughout much of Central and Southern Europe and is commonly classified within *Festuco-Brometea* (Horvat et al. 1974, Ellenberg 1988, Sýkora et al. 2003, Davies et al. 2004). Annual-dominated subnitrophilous *Dasyphyrum villosum* grasslands of the Campagna Romana, Central Italy, have been studied by Fanelli (1998) who included them in the order *Thero-Brometalia*. The *Artemisia campestris-Dasyphyrum villosum* community of our study area is similar to those *Dasyphyrum*-dominated grasslands in their slightly nitrophytic character, reflecting a certain degree of former or current disturbance. However, in the *Dasyphyrum* grasslands short-lived, mostly annual, plants prevail and *Dasyphyrum villosum* is dominant, while our community comprises grasslands dominated by perennials, chiefly *Artemisia campestris*, with *Dasyphyrum villosum* and other tall annuals being frequent but with very low cover.

2. The second group corresponds to the *Chrysopogon gryllus-Bothriochloa ischaemum* community (Table 5). This plant community appears in patches, in small depressions and along small rills of moderate inclination, where the soil is deeper, with higher silt content and thus a higher water holding capacity. Similar plant communities were described elsewhere in the Balkans and have been interpreted as the result of secondary succession on sites of former deciduous forests (Szollát & Standovár 2005, Matevski et al. 2008). The absence or low abundance of *Stipa* species and their replacement by sub-Mediterranean grazing-tolerant grasses of the tribe *Andropogoneae*, *Chrysopogon gryllus* and *Bothriochloa ischaemum*, has been attributed mainly to the grazing pressure of domestic animals (Tzonev et al. 2006).

3. The third group, the *Satureja montana-Artemisia alba* community (Table 4), is represented by relevés sampled on stony ground at the highest elevations of the study area. It develops on steep eroded slopes, covered with marl slates or stones of different size. Its species composition resembles that of the *Artemisia alba* community described by Bergmeier et al. (2009) from Mt. Falakro. This community has been termed Greek-Balkan steppes with *Satureja montana* (Matevski et al. 2008). Under this name, Matevski et al. (2008) classified steppe-like grasslands of perennial species occurring “in the sub-Mediterranean and sub-Pannonian region of the Balkans in the *Quercion frainetto* and *Fagion moesiaca* zones, from Greece to Serbia and west Bulgaria”. Al-

legrezza et al. (1997) used these two species as indicators of the alliance *Artemisia alba-Saturejion montanae* (*Rosmarinetea officinalis*), which occurs in the micro-garrigues of the hilly, submontane and lower montane belts of the central Apennines.

4. The fourth group corresponds to the *Stipa capillata-Koeleria macrantha* community (Table 7), and includes the majority of relevés sampled in the study area. It occurs mainly on the hill slopes of low to moderate inclination and on soil that is less gravelly or rocky than the other vegetation units. This community is relatively heterogeneous, as it is differentiated floristically according to the soil properties. In sites with very shallow lithic leptosols, the vegetation is rich in stress-tolerant chasmophytes and other drought-resistant species (e.g. *Inula verbascifolia* subsp. *aschersoniana*, *Stachys iva*). At sites with better soil conditions, shrubby species occur sporadically (e.g. *Juniperus oxycedrus*, *Paliurus spina-christi*, *Prunus webbii*). Similar communities, in which *Stipa capillata* and *Festuca valesiaca* dominate while *Chrysopogon gryllus* is less abundant or absent, have been described from Central Europe and the Balkan Peninsula (Micháľková 2007, Sopotlieva 2009, Tzonev et al. 2009).

All communities described here were classified within the phytosociological class of *Festuco-Brometea*. In Central Europe this class includes the dry and semi-dry grasslands on base-rich soils (lowland steppes, rocky and sandy secondary and primary calcareous grasslands) of low to (sub) montane altitudes (Ellenberg 1988, Mucina 1997, Rodwell et al. 2002) while in southern Europe it includes also the rocky limestone grasslands of the montane belt (Biondi et al. 1995, Di Pietro 2011). Vegetation differentiation within *Festuco-Brometea* in Europe shows a geographic pattern from more mesophytic swards in the Atlantic zone to continental steppe grasslands and steppes in the south-east (Rodwell et al. 2007). In the Balkan Peninsula, *Festuco-Brometea* is represented by *Scorzonero-Chrysopogonetalia*, which includes the sub-Mediterranean grasslands of the north-western sector of the Dinarids (Horvatić 1973, 1975, Feoli-Chiapella & Poldini 1993, Poldini 1995, Terzi 2011), by *Festucetalia valesiaca* extending from eastern Central Europe through the eastern and south-eastern Balkans, and by *Astragalo-Potentilletalia*, which includes the sub-Mediterranean/sub-continental lowland to montane grasslands of the south-central Balkans (Bergmeier et al. 2009, Redzic 2010).

Table 1: Synoptic relative constancy table of the communities of steppe-like grassland vegetation in the surroundings of the Lakes of Vegoritida and Petron. 1: *Artemisia campestris-Dasypyrum villosum* community, 2: *Chrysopogon gryllus-Bothriochloa ischaemum* community, 3: *Satureja montana-Artemisia alba* community, 4: *Stipa capillata-Koeleria macrantha* community. Vegetation layer h: herb, s: shrub, t: tree. Differential taxa of the distinguished communities are shown with bold typescript.

Tabela 1: Sinoptična tabela stanovitnosti združb stepi podobne traviščne vegetacije v okolici jezer Vegoritida in Petron. 1: združba *Artemisia campestris-Dasypyrum villosum*, 2: združba *Chrysopogon gryllus-Bothriochloa ischaemum*, 3: združba *Satureja montana-Artemisia alba*, 4: združba *Stipa capillata-Koeleria macrantha*. Plast vegetacije h: zeliščna, s: grmiščna, t: drevesna. Razlikovalne vrste posameznih združb so prikazane s krepko pisavo.

Number of cluster (plant community)	Vegetation layer	Absolute constancy	1	2	3	4	Number of cluster (plant community)	Vegetation layer	Absolute constancy	1	2	3	4
Number of relevés			48	26	30	141	Number of relevés			48	26	30	141
Average species number			27	24	25	27	Average species number			27	24	25	27
Differential taxa							<i>Anthericum liliago</i>	h	22	.	.	37	8
<i>Erysimum crassistylum</i>	h	60	81	31	7	8	<i>Petrorhagia thessala</i>	h	57	8	12	17	32
<i>Avena sterilis</i>	h	30	48	15	.	2	Differential taxa of more than one cluster						
<i>Bromus tectorum</i>	h	29	46	15	.	2	<i>Artemisia alba</i>	h	88	29	23	70	33
<i>Micromeria cremonophila</i>	h	71	42	23	17	28	<i>Teucrium capitatum</i>	h	193	85	69	73	79
<i>Marrubium peregrinum</i>	h	19	35	8	.	.	<i>Koeleria macrantha</i>	h	168	65	54	53	76
<i>Cynodon dactylon</i>	h	18	33	4	.	1	<i>Euphorbia myrsinites</i>	h	141	50	42	30	69
<i>Anthemis arvensis</i> ssp. <i>incrassata</i>	h	20	33	4	.	2	<i>Thymus sibthorpii</i>	h	177	65	85	87	70
<i>Vulpia ciliate</i>	h	15	29	4	.	.	<i>Chrysopogon gryllus</i>	h	137	21	58	70	65
<i>Stipa</i> cf. <i>endotricha</i>	h	32	.	.	67	9	<i>Satureja montana</i> ssp. <i>macedonica</i>	h	79	21	42	87	23
<i>Bromus cappadocicus</i>	h	50	6	19	53	18	<i>Fumana procumbens</i>	h	100	8	23	53	52
<i>Fumana scoparia</i>	h	30	.	19	43	9	<i>Hypericum rumeliacum</i>	h	57	10	27	23	27

Number of relevés		48	26	30	141	Number of relevés		48	26	30	141
<i>Stachys iva</i>	h	94	15	15	87 40	Phanerophytes of <i>Quercetea pubescentis</i>, <i>Rhamno-Prunetea</i> and <i>Quercetea ilicis</i>					
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	h	99	29	23	77 40	<i>Paliurus spina-christi</i>	s	7	2	4	4
<i>Asperula aristata</i>	h	114	13	4	63 62	<i>Hippocrepis emerus</i> ssp. <i>emeroides</i>	s	3	.	.	3 1
<i>Astragalus sericophyllus</i>	h	71	10	15	60 31	<i>Carpinus orientalis</i>	s	2	.	.	1
<i>Scabiosa webbiana</i>	h	90	8	15	60 45	<i>Prunus spinosa</i>	s	5	.	4	3
<i>Inula verbascifolia</i> ssp. <i>aschersoniana</i>	h	73	6	.	40 41	<i>Rubus sanctus</i>	s	1	.	.	1
<i>Helianthemum salicifolium</i>	h	129	48 58	10	62	<i>Rosa agrestis</i>	s	1	.	.	1
<i>Eryngium campestre</i>	h	120	90 62	10	41	<i>Juniperus oxycedrus</i>	s	45	2	.	13 28
<i>Crupina crupinastrum</i>	h	114	67 73	10	43	<i>Prunus webbii</i>	s	9	2	.	6
<i>Helichrysum luteoalbum</i>	h	67	48 31	10	23	<i>Asparagus acutifolius</i>	s	6	.	.	4
<i>Bothriochloa ischaemum</i>	h	103	38 77	20	42	<i>Rhamnus alaternus</i> ssp. <i>alaternus</i>	s	5	.	.	4
<i>Stipa capillata</i>	h	131	25 35	17	74	<i>Phillyrea latifolia</i>	s	3	.	.	2
Differential taxa of <i>Festuco-Brometea</i>						<i>Pistacia terebinthus</i> ssp. <i>terebinthus</i>	s	1	.	.	1
<i>Melica ciliata</i>	h	114	35	19	30 59	Differential taxa of <i>Asplenietea trichomanis</i>					
<i>Festuca valesiaca</i>	h	92	4	.	47 54	<i>Aurinia saxatilis</i> ssp. <i>orientalis</i>	h	16	23	4	3
<i>Ononis pusilla</i>	h	66	27	19	27 28	<i>Iris reichenbachii</i>	h	10	.	.	7
<i>Eryngium amethystinum</i>	h	55	2	.	23 33	<i>Campanula lingulata</i>	h	6	.	.	4
<i>Lomelosia argentea</i>	h	54	27	23	7 23	<i>Asplenium ceterach</i>	h	1	.	.	3 .
<i>Linum tenuifolium</i>	h	49	2	12	37 24	Differential taxa of <i>Thlaspietea rotundifolii</i>					
<i>Sedum urvillei</i>	h	43	10	12	10 23	<i>Linaria simplex</i>	h	35	27	15	20 9
<i>Sanguisorba minor</i>	h	40	2	4	7 26	<i>Aethionema saxatile</i> ssp. <i>graecum</i>	h	4	4	.	3 1
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	h	36	17	8	20 14	Differential taxa of <i>Stellarietea mediae</i>					
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	h	32	4	4	10 18	<i>Bromus squarrosus</i>	h	30	6	23	15
<i>Sedum ochroleucum</i>	h	31	.	4	3 21	<i>Euphorbia helioscopia</i>	h	19	6	23	17 4
<i>Carex liparocarpos</i>	h	31	.	.	13 19	<i>Geranium rotundifolium</i>	h	13	4	15	3 4
<i>Helianthemum oelandicum</i> ssp. <i>canum</i>	h	30	.	.	23 16	<i>Consolida regalis</i>	h	12	17	12	1
<i>Onobrychis arenaria</i> ssp. <i>lasiostachya</i>	h	29	15	12	3 13	<i>Coronilla scorpioides</i>	h	11	4	23	2
<i>Jurinea mollis</i> ssp. <i>mollis</i>	h	28	.	.	10 18	<i>Lathyrus cicera</i>	h	7	13	4	.
<i>Convolvulus cantabrica</i>	h	23	4	15	3 11	<i>Ajuga chamaepitys</i> ssp. <i>chia</i>	h	3	2	.	1
<i>Alyssum montanum</i> ssp. <i>montanum</i>	h	16	13	8	3 5	<i>Fumaria officinalis</i> ssp. <i>officinalis</i>	h	3	4	4	.
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	h	15	6	4	8	<i>Caucalis platycarpus</i>	h	3	4	.	1
<i>Chondrilla juncea</i>	h	15	27	8	.	<i>Heliotropium europaeum</i>	h	2	4	.	.
<i>Pilosella hoppeana</i>	h	15	2	.	10	<i>Veronica arvensis</i>	h	2	4	.	.
<i>Thesium linophyllum</i>	h	14	13	.	17 2	<i>Hordeum murinum</i>	h	1	2	.	.
<i>Astragalus onobrychis</i>	h	13	4	8	10 4	<i>Viola arvensis</i>	h	1	.	.	1
<i>Herniaria incana</i>	h	11	17	.	2	Differential taxa of <i>Artemisieteae vulgaris</i>					
<i>Inula oculus-christi</i>	h	11	.	.	3 7	<i>Echinops sphaerocephalus</i> ssp. <i>albidus</i>	h	24	17	15	9
<i>Cytisus procumbens</i>	h	9	.	.	20 2	<i>Carthamus lanatus</i>	h	7	15	.	.
<i>Teucrium chamaedrys</i>	h	9	15	.	1	<i>Cichorium intybus</i>	h	6	10	.	1
<i>Thalictrum minus</i> ssp. <i>saxatile</i>	h	6	.	.	20 .	<i>Reseda lutea</i>	h	5	2	.	3 2
<i>Muscari neglectum</i>	h	6	.	.	4	<i>Picnoman acarna</i>	h	1	2	.	.
<i>Galium verum</i>	h	6	2	.	4	<i>Tragopogon dubius</i>	h	1	2	.	.
<i>Trinia glauca</i>	h	6	.	.	7 3	Companion taxa					
<i>Allium moschatum</i>	h	6	.	.	4	<i>Leontodon crispus</i>	h	111	33	19	73 48
<i>Teucrium montanum</i>	h	6	.	.	17 1	<i>Acinos suaveolens</i>	h	101	38	42	53 40
<i>Allium paniculatum</i>	h	4	.	.	3	<i>Centaurea grisebachii</i>	h	99	15	31	20 55
<i>Hippocrepis comosa</i>	h	4	.	.	3	<i>Minuartia verna</i> ssp. <i>collina</i>	h	97	6	23	37 55
<i>Onosma visianii</i>	h	4	.	.	10 1	<i>Xeranthemum inapertum</i>	h	75	31	46	3 33
<i>Seseli pallasii</i>	h	3	.	.	2	<i>Poa bulbosa</i>	h	71	19	19	7 39
<i>Hypericum perforatum</i>	h	3	.	.	2	<i>Thesium humile</i>	h	67	17	27	33 30
<i>Phelipanche purpurea</i>	h	3	.	.	3 1	<i>Silene radicata</i>	h	62	6	23	10 35
<i>Bromus erectus</i>	h	2	.	.	1	<i>Bromus intermedius</i>	h	57	35	23	10 22
<i>Lactuca viminea</i>	h	1	2	.	.	<i>Silene conica</i>	h	56	40	31	3 20
<i>Securigera varia</i>	h	1	2	.	.	<i>Medicago minima</i>	h	53	63	38	7 8
						<i>Hippocrepis ciliata</i>	h	52	19	27	7 24

Number of relevés					Number of relevés								
		48	26	30	141		48	26	30	141			
<i>Verbascum leucophyllum</i>	h	45	56	31	7	<i>Pterocephalus plumosus</i>	h	7	4	4			
<i>Echinops microcephalus</i>	h	42	6	23	7	22	<i>Verbascum graecum</i>	h	7	4	4		
<i>Allium guicciardii</i>	h	41	4	10	26	<i>Lappula patula</i>	h	7	10	3			
<i>Valerianaella rimosa</i>	h	36	27	35	10	8	<i>Potentilla detommasii</i>	h	7	4	4		
<i>Dianthus gracilis</i> ssp. <i>gracilis</i>	h	35	2	17	21	<i>Catapodium rigidum</i>	h	7	6	4	2		
<i>Potentilla recta</i>	h	35	8	19	13	16	<i>Erodium cicutarium</i>	h	7	10	4	1	
<i>Paronychia macedonica</i>	h	32	2	4	10	19	<i>Alyssum corymbosoides</i>	h	6	2	7	2	
<i>Linum bienne</i>	h	32	10	19		<i>Taraxacum spec.</i>	h	6	10	4			
<i>Arenaria serpyllifolia</i>	h	31	35	31	10	2	<i>Quercus trojana</i> ssp. <i>trojana</i>	s	6			4	
<i>Sideritis montana</i> ssp. <i>montana</i>	h	31	2	12	19		<i>Quercus trojana</i> ssp. <i>trojana</i>	t	6		3	4	
<i>Scorzonera mollis</i> ssp. <i>mollis</i>	h	29	12	3	18		<i>Thymus boissieri</i>	h	6		10	2	
<i>Asyneuma limonifolium</i> ssp. <i>limonifolium</i>	h	28	13	17		<i>Festuca jeanpertii</i>	h	6	2		4		
<i>Ornithogalum divergens</i>	h	23	4	3	15		<i>Pyrus spinosa</i>	s	6			4	
<i>Carlina corymbosa</i>	h	21	25	15	4		<i>Medicago orbicularis</i>	h	6	10	4		
<i>Petrorhagia illyrica</i> ssp. <i>illyrica</i>	h	21	15	4	9		<i>Cerastium brachypetalum</i> ssp. <i>roeseri</i>	h	6			4	
<i>Brachypodium distachyon</i>	h	20	15	19	6		<i>Minuartia hamata</i>	h	6	4	8	1	
<i>Orlaya daucoides</i>	h	19	27	8	7	1	<i>Minura exaratum</i>	h	5	6		1	
<i>Onosma heterophylla</i>	h	19	2	7	11		<i>Achnatherum bromoides</i>	h	5	2	3	2	
<i>Cruciata pedemontana</i>	h	19	10	15	10	5	<i>Haplophyllum coronatum</i>	h	5		13	1	
<i>Arrhenatherum palaestinum</i>	h	19	17	15	13	2	<i>Hieracium pannosum</i>	h	5		7	2	
<i>Crepis sancta</i>	h	18	23	19	1		<i>Clypeola jonthlaspi</i> ssp. <i>jonthlaspi</i>	h	5	2	8	3	1
<i>Prospero autumnale</i>	h	18	2	19	9		<i>Podospermum laciniatum</i>	h	5			4	
<i>Avena barbata</i> ssp. <i>barbata</i>	h	17	15	23	3		<i>Silene graeca</i>	h	5	12	3	1	
<i>Erodium absinthoides</i>	h	16			11		<i>Hypochaeris cretensis</i>	h	4	6	4		
<i>Calamintha nepeta</i>	h	14	19	4	3	2	<i>Papaver rhoeas</i>	h	4	8			
<i>Asphodeline liburnica</i>	h	14			10		<i>Lathyrus saxatilis</i>	h	4	4	4	1	
<i>Alyssum sibiricum</i>	h	14	4	9			<i>Tragopogon porrifolius</i>	h	4	2	4	1	
<i>Medicago monspeliaca</i>	h	14	17	4	4		<i>Plantago lanceolata</i>	h	4			3	
<i>Medicago tuberculata</i>	h	13	25	4			<i>Onobrychis gracilis</i>	h	4			3	
<i>Trifolium scabrum</i>	h	13	4	8	6		<i>Bellardia latifolia</i>	h	4			3	
<i>Centaurea graeca</i>	h	12	2	7	6		<i>Coronilla valentina</i> ssp. <i>glauca</i>	h	4	2		2	
<i>Centaurea salonitana</i>	h	11	6	4	5		<i>Betonica officinalis</i>	h	4	6	3		
<i>Goniolimon heldreichii</i>	h	9	19	3			<i>Asterolinon linum-stellatum</i>	h	4	2	3	1	
<i>Thesium macedonicum</i>	h	9	4	3	5		<i>Cynosurus echinatus</i>	h	3	4		1	
<i>Crucianella graeca</i>	h	9	10	15			<i>Achillea holosericea</i>	h	3	2		1	
<i>Bromus benekenii</i>	h	9			6		<i>Geranium purpureum</i>	h	3	2	4	3	
<i>Psilurus incurvus</i>	h	9	10	8	1		<i>Ziziphora capitata</i>	h	3	12			
<i>Ranunculus sprunerianus</i>	h	9	4	3	5		<i>Valerianaella carinata</i>	h	3	4		1	
<i>Lens nigricans</i>	h	8	13	8			<i>Medicago coronata</i>	h	3	2	8		
<i>Bupleurum praealtum</i>	h	8	8	7	3		<i>Medicago medicaginoidea</i>	h	3	4		1	
<i>Achillea fraasii</i>	h	8		17	2		<i>Scandix australis</i>	h	3	2	8		
<i>Petrorhagia prolifera</i>	h	7	15				<i>Dactylis glomerata</i>	h	3			2	
<i>Achillea chrysocoma</i>	h	7	13		1		<i>Hornungia petraea</i>	h	3			2	
<i>Trifolium campestre</i>	h	7	15				<i>Origanum vulgare</i>	h	2	2		1	
<i>Pilosella bauhini</i>	h	7	2	4	3	3	<i>Lotus corniculatus</i>	h	1	4			
<i>Polygala supina</i> ssp. <i>rhodopaea</i>	h	7	2	7	3		<i>Campanula patula</i>	h	1			1	

Taxa occurring in two or one relevés (within brackets the community they occur in is given): *Cionura erecta* (2), *Polygonum aviculare* ssp. *neglectum* (2), *Micropus erectus* (2), *Scabiosa triniifolia* (2), *Linaria peloponnesiaca* var. *parnassica* (2), *Crepis neglecta* (2), *Nigella arvensis* ssp. *arvensis* (2), *Cuscuta epithimum* (2), *Nigella damascena* (2), *Lomelosia brachiata* (2), *Carex extensa* (1), *Genista sessilifolia* (1), *Echium arenarium* (1), *Salvia officinalis* (1), *Cistus creticus* (1), *Linum nodiflorum* (1), *Astragalus monspessulanus* ssp. *monspessulanus* (1), *Myosotis incrassata* (1).

We classified all four communities distinguished in our study in the latter order. Our communities, as well as the entire order *Astragalo-Potentilletalia*, shows an intermediate geographical and floristic position between the more western sub-Mediterranean *Scorzonero-Chrysopogonetalia*, the more eastern *Festucetalia valesiaca*, and the Mediterranean pasturelands of the *Thero-Brachypodietea* further south. With the *Scorzonero-Chrysopogonetalia*, the *Astragalo-Potentilletalia* shares sub-Mediterranean species such as *Fumana procumbens*, *Chrysopogon gryllus*, *Euphorbia myrsinites*, *Helianthemum nummularium* and *H. oelandicum* subsp. *canum*; with the *Festucetalia valesiaca*, it shares species of continental distribution such as *Stipa capillata* and *Festuca valesiaca*; and with the Mediterranean grasslands, it shares many annuals as well as the chamaephytes *Artemisia alba*, *Teucrium capitatum* and *Thymus sibthorpii*. The *Satureja montana-Artemisia alba* community and the

Stipa capillata-Koeleria macrantha community can be furthermore assigned to the alliance *Saturejion montanae* (*Saturejo-Thymion*). This assignment is supported by a lot of differential species of this alliance, such as *Satureja montana*, *Artemisia alba*, *Vincetoxicum hirundinaria* subsp. *nivale*, *Sedum ochroleucum*, *Leontodon crispus*, *Cytisus procumbens*, *Alyssum montanum* subsp. *montanum*, *Anthyllis vulneraria* subsp. *scardica*, *Helianthemum oelandicum* subsp. *canum*, *Teucrium montanum*, *Minuartia verna* subsp. *collina* and *Trinia glauca* (based on the table provided by Horvat et al. 1974).

3.2 ORDINATION

The results of the DCA analysis are presented in Table 2. In the DCA diagram (Fig. 2) the four vegetation units are clearly distinct.

Table 2: Eigenvalues, length of gradient and total inertia of the DCA.

Tabela 2: Lastne vrednosti, dolžina gradienta in variabilnost vseh DCA ordinacijskih osi.

Axis	1	2	Total inertia
Eigenvalues	0.431	0.269	7.639
Lengths of gradient	3.532	2.910	
Cumulative percentage variance of species-environment relation	25.1	38.8	

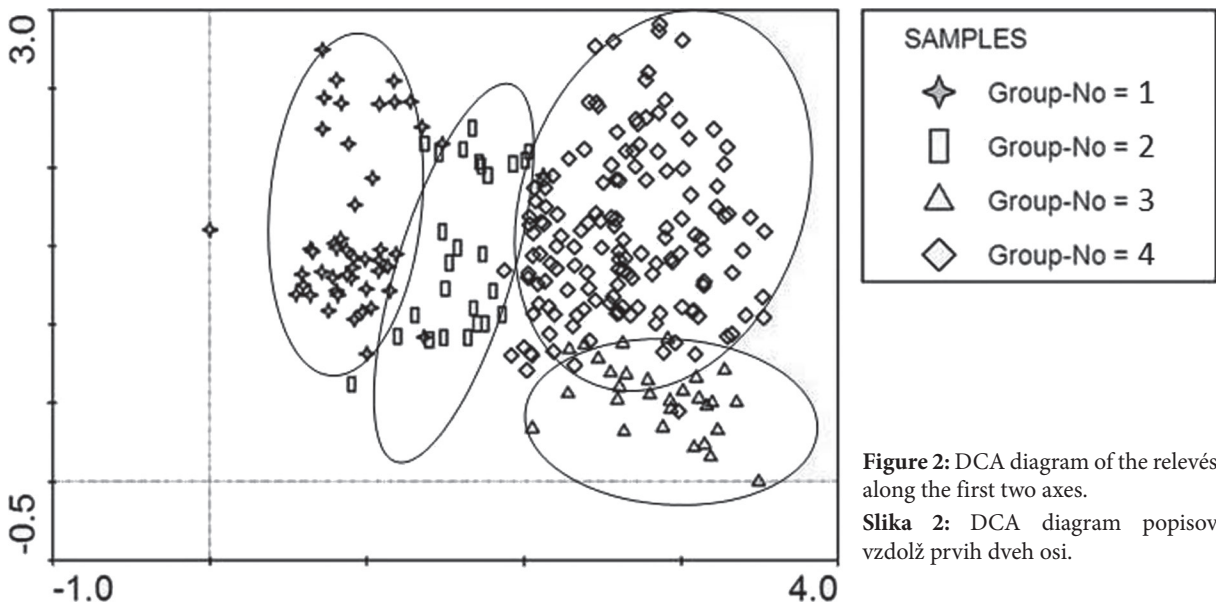


Figure 2: DCA diagram of the relevés along the first two axes.

Slika 2: DCA diagram popisov vzdolž prvih dveh osi.

The first DCA axis was positively correlated with continentality and soil reaction and negatively correlated with the nutrient content of the

soil (Figure 3, Table 3). Furthermore, the first axis is significantly, but less strongly correlated with light intensity, temperature, moisture, alti-

tude, inclination, annual radiation, heat load and longitude (Figure 3, Table 3). According to the correlations of the first axis with the explanatory variables, we may say that it represents a gradient related to soil properties (pH and nutrient content) and to climatic conditions. However, as the study area is too small to expect a large-scale climatic differentiation, the increase of continentality along the first DCA axis probably reflects the occurrence of more cold-tolerant species with higher continentality IVs in the right part of the diagram. The cooler micro-climate in the relevés of the third and fourth groups, which appear in the right-hand part of the DCA diagram, may be attributed to the fact that these groups occur at higher elevations in the study area and on wind-exposed slopes. The very shallow soil in the sites of the third and fourth groups, and hence the more direct effect of the calcareous substrate, may also be responsible for the higher soil reaction values as well as for the lower moisture and nutrient content (on shallower soils the available water and nutrient content is reduced).

The second DCA axis is significantly positively correlated with temperature and salinity, and negatively correlated with moisture, altitude and inclination. It may thus represent an altitudinal and drought gradient, separating mainly the more xerophilous *Satureja montana-Artemisia alba* community occurring on steeper slopes from the *Stipa capillata-Koeleria macrantha* community occurring at lower altitudes and on less steep slopes. Furthermore, the second DCA axis is relatively strongly related to geographical coordinates, simply because the hilly landscape is confined to the northern part of the study area.

3.3 RELICT VEGETATION OR SECONDARY GRASSLAND?

Temperate grasslands of Eurasia are either natural climax, as steppe and around rock outcrops, or secondary semi-natural sward as a result of forest degradation (Coupland 1993, Poschlod & WallisDe Vries 2002, Rodwell et al. 2007). Lowland climax grasslands in the western and central Mediterranean are restricted to the most arid parts of North Africa, SE Spain, SE Italy and S Greece (Grove & Rackham 2001, Maestre & Cortina 2002, Forte et al. 2005, Terzi et al. 2010).

Do our studied steppe-like grasslands represent a relict of true steppe communities, or are

Table 3: Kendall's correlation coefficients between the explanatory variables and DCA relevé scores. **, *: significant correlation at $\alpha < 0.01$ and 0.05 , respectively.

Tabela 3: Kendallov korelacijski koeficient med pojasnjevalnimi spremenljivkami in DCA vrednostmi popisov. **, *: korelacija je statistično značilna pri $< 0,01$ in $0,05$.

Explanatory Variables	Axis 1	Axis 2
Light	-0.218**	0.044
Temperature	-0.306**	0.212**
Continentality	0.506**	0.083
Moisture	-0.305**	-0.267**
soil Reaction	0.497**	-0.037
Nutrient	-0.421**	0.016
Salinity	-0.04	0.154**
Altitude	0.276**	-0.242**
Incination	0.224**	-0.231**
annual Radiation	0.197**	0.03
Heat load	0.170**	0.042
X coordinates	-0.172**	-0.451**
Y coordinates	-0.071	-0.257**

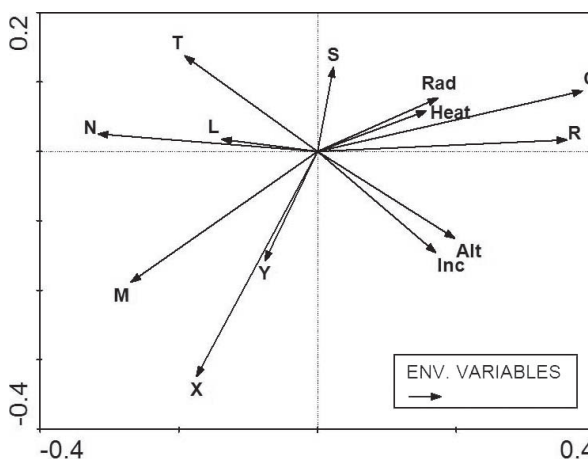


Figure 3: Environmental variables passively projected onto the DCA diagram of the first two axes. For the abbreviations of explanatory variables see Table 3 (letters with bold typescript).

Figure 3: Okoljske spremenljivke, pasivno prikazane na DCA diagramu prvih dveh osi. Okrajšave pojasnjevalnih spremenljivk so enake kot v Tabeli 3 (krepka pisava).

they secondary grassland, representing degradation stages of forest vegetation?

The number of steppe species in our study area is relatively small, but they may be abundant locally in dry grasslands. Chiefly feather grasses (*Stipa* spp.) give a steppe-like impression (Price 2002, Apostolova et al. 2008, Matevski et al. 2008). Three *Stipa* species have been found in

the study area (Pirini et al. 2010), namely *S. capillata*, *S. balcanica* (*S. joannis* subsp. *balcanica*), and *S. cf. endotricha*. Further species in the study area that occur in natural steppes are *Bombycilaena erecta*, *Chondrilla juncea*, *Festuca valesiaca*, *Phleum phleoides*, *Kengia serotina*, *Melica transsilvanica*, *Astragalus onobrychis* and *Jurinea mollis* (Gamarra & Montuto 1997, Fekete et al. 2002, Meshinev et al. 2005, Pirini et al. 2010).

Steppe plants have been present in the majority of the Balkan region since the Pliocene. They survived and spread during the cold periods and some remained in the Holocene as relicts of the Tertiary flora (Horvat et al. 1974, Schmid 1975, Ellenberg 1988, Matevski et al. 2008). Possible refugia for steppe species – grasslands that remained non-forested throughout the post-glacial period – exist in the Balkan Peninsula. Is the study area therefore a possible steppe species refuge?

Although the plant communities described in this study represent open grasslands, woody species of forest and pre-forest do occur, albeit scattered (Table 1). Furthermore, different vegetation types that represent successional stages can be found in the study area. The main woodland-forming tree is *Quercus trojana*, an east Mediterranean oak species distributed from south Italy through the Balkan Peninsula to west and south Anatolia (Fukarek 1975, Yaltirik 1975, Bianco et al. 1998, Biondi et al. 2004, Zieliński et al. 2006, Misano & Di Pietro 2007, Di Pietro & Misano 2009, Ugurlu et al. 2012). In Greece, this oak species is restricted to the northwestern, sub-mediterranean-subcontinental part, substituting the less hardy *Q. coccifera*, which prevails further south and south-east. Different degradation stages of forest exist in the study area, from open woodlands with low canopy cover and high abundance of *Festuco-Brometea* grassland species up to bushland in which *Juniperus oxycedrus* is the dominant woody species, albeit with low cover. Thus, the heterogeneous vegetation in the study area with open oak woodlands, shrub formations and steppe-like grasslands probably represents a series of successional stages of vegetation. Hence the grasslands in the study area must be considered secondary as a result of forest degradation.

However, we advocate an intermediate hy-

pothesis, whereby some of the steppe plant populations may have occurred throughout postglacial times in a more or less wooded environment. In the understory of *Quercus trojana* woodlands, many light-demanding plants occur. *Quercus trojana*, quite like its “Mediterranean counterpart” *Q. coccifera*, is extremely resilient and tolerant to browsing. It is an essential element of certain shrublands of the *shibljak* type, a wooded deciduous pastureland of the subcontinental parts of the Balkans and the Black Sea area. Under postglacial and current climatic as well as land use (grazing) conditions in our area, and depending on the degree of their demand for light, steppe species may have occurred either in open oak woodlands or in various kinds of *shibljak*-type degradation stages. The calcareous substrate and the geomorphology of the area as well as wood pasture and other human disturbance since ancient times (Pavlidis & Mountrakis 1987, Kloosterboer-van Hoeve et al. 2006) have contributed to the expansion of suitable habitats for steppe species. In Apulia, Biondi & Guerra (2008), Di Pietro & Misano (2010) and Terzi et al. (2010) observed various types of successional stages dynamically linked to the potential *Quercus trojana* forests. The hypothesis needs further vegetation inventories and studies on the dynamics of vegetation, as well as corroboration by findings from the fields of paleobotany, plant geography and population genetics. The steppe-like grasslands around the Lakes of Vegoritida and Petron are clearly secondary steppe grasslands but it is rather likely that populations of steppe species have occurred continuously in deciduous woodlands and shrublands, in landscapes that were probably never densely wooded throughout the Holocene.

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Table 4: Relevés table of the *Satureja montana* - *Artemisia alba* comm.
Tabela 4: Tabela popisov združbe *Satureja montana* - *Artemisia alba*.

Relevé number	298	299	318	321	256	301	280	297	229	288	289	304	277	255	234	262	287	257	278	279	315	290	293	233	235	236	322	230	237	254	
Relevé area (m ²)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	20	20	20	30	30	30	30	30	30	30	20	
Altitude (m)	640	670	700	690	720	740	710	620	670	670	660	735	650	700	770	705	700	730	690	705	630	650	650	770	770	760	655	720	710	670	
Exposition	N	N	NW	N	SE	W	NE	NW	SE	NE	NE	N	E	S	E	NE	NE	NE	SE	N	N	N	SW	SE	E	E	SW	E	SE	S	
Slope (%)	65	75	50	30	20	15	10	50	70	40	50	20	70	30	80	15	25	20	70	60	60	70	30	80	70	65	50	55	80	15	
Cover tree layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cover shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cover herb layer (%)	65	70	50	40	70	50	70	65	35	55	70	80	40	50	35	65	50	60	25	40	40	50	40	35	60	40	50	30	30		
Locality	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
Aspect (°)	360	360	315	360	135	270	45	315	135	45	45	360	90	180	90	45	45	45	45	135	360	360	225	135	90	90	225	90	135	180	
Differential taxa																															
<i>Satureja montana</i> ssp. <i>macedonica</i>	1	+	2	2	1	+	1	1	1	1	1	+	.	+	+	+	+	+	+	+	2	+	.	1	1	+	.	+	+	+	
<i>Artemisia alba</i>	+	1	+	r	+	+	+	3	1	.	.	+	.	+	.	+	1	1	.	+	+	.	.	1	1	+	1	.	+	r	
<i>Chrysopogon gryllus</i>	1	.	+	+	2	1	3	.	1	3	3	2	.	.	.	+	2	+	+	.	.	+	r	.	+	r	1	+	+	.	
<i>Stipa cf. endotricha</i>	+	1	.	.	.	+	+	+	+	.	.	.	+	+	1	3	2	2	+	.	.	+	+	1	2	+	.	1	+	+	
<i>Thymus sibthorpii</i>	+	.	.	+	+	+	+	+	+	+	+	+	+	1	1	+	+	1	+	+	+	+	+	+	+	+	+	.	1	+	
<i>Scabiosa webbiana</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	.	.	.	+	+	+	.	r	.	+	r	.	.	.	.	.	+
<i>Fumana procumbens</i>	+	.	+	+	+	.	.	.	+	.	.	.	.	1	+	+	.	+	.	.	+	.	.	+	.	+	1	+	.	1
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+	.	.	+	+	+	.	+	+	+	.	+	1	+	+	
<i>Stachys iva</i>	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Asperula aristata</i>	+	.	.	+	+	+	+	+	+
<i>Astragalus sericophyllus</i>	+	.	.	+	1	.	+	+	+	.	.	+	+	+	+	+	+	.	+	+	+	+	+	.	1	+	.	.	.	r	
<i>Teucrium capitatum</i>	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+	+	.	
<i>Koeleria macrantha</i>	.	.	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+	+	.	
<i>Bromus cappadocicus</i>	.	.	+	+	+	+	+	+	+	+	+	+	+	1	1	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.
<i>Fumana scoparia</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	.	.	.	.	.	.	.
<i>Euphorbia taurinensis</i>
<i>Vincetoxicum hirundinaria</i> ssp. <i>nivale</i>	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Anthyllis vulneraria</i> ssp. <i>scardica</i>
<i>Anthericum liliago</i>	+	+	.	.	+	.	.	r	.	r	.	.	.	r	r
<i>Hypericum rumeliacum</i>
<i>Cerastium decalvans</i>	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Matthiola fruticulosa</i> ssp. <i>valesiaca</i>	+
<i>Euphorbia myrsinites</i>	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	r	+	+	+	+	+	+	
<i>Salvia ringens</i>	2	2	1	1	+	1	+	+	+	+	r

Table 5: Relevés table of the *Chrysopogon gryllus* - *Bothriochloa ischaemum* comm.
Tabela 5: Tabela popisov združbe *Chrysopogon gryllus* - *Bothriochloa ischaemum*.

Relevé number	10	14	18	319	251	264	265	171	190	323	187	189	188	284	11	51	260	283	239	309	212	213	310	286	231	292	
Relevé area (m ²)	50	40	40	30	30	30	30	40	40	30	40	40	40	30	50	40	30	30	30	30	30	30	30	30	30	30	30
Altitude (m)	575	590	580	720	615	680	660	650	660	600	640	660	650	710	578	580	720	715	670	685	590	630	635	705	720	650	
Exposition	NW	S	S	W	E	S	S	S	S	SW	S	S	SW	N	NW	W	SE	E	SE	E	W	W	E	SE	S	E	
Slope (%)	10	10	10	70	50	40	60	55	15	60	15	15	15	5	10	20	15	5	70	50	25	30	50	10	50	10	
Cover tree layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover herb layer (%)	80	75	80	60	75	60	60	80	70	60	70	55	60	80	60	75	100	85	70	70	70	40	60	75	55	70	
Locality	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Aspect (°)	315	180	180	270	90	180	180	180	180	225	180	180	225	360	315	270	135	90	135	90	270	270	90	135	180	90	
Differential taxa																											
<i>Bothriochloa ischaemum</i>	3	3	4	3	1	3	2	3	2	3	3	3	3	3	1	1	.	.	r	.	.	.	1	2	.	2	
<i>Chrysopogon gryllus</i>	.	.	+	r	3	.	.	+	2	.	+	+	.	.	.	.	.	.	3	3	2	1	1	1	r	1	
<i>Stipa capillata</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	.	.	.	.	.	.	.	1	.
<i>Thymus sibthorpii</i>	+	+	+	+	+	1	1	.	.	1	+	+	+	+	1	+	1	.	.	+	1	+	+	1	+	+	
<i>Artemisia campestris</i>	+	1	r	r	+	.	.	+	+	+	r	.	+	r	1	1	+	r	1	+	+	+	.	.	.	.
<i>Satureja montana</i> ssp. <i>macedonica</i>	+	+	+	+	1	+	1	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	r	+	.	.	
<i>Crupina crupinastrum</i>	.	+	.	.	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Koeleria macrantha</i>	.	.	.	+	.	+	+	.	.	+	+	+	+	.	.	.	+	.	+	+	.	.	.	+	+	+	+
<i>Teucrium capitatum</i>	.	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	.	+	.	+	+	+	+	.	+	.	
<i>Eryngium campestre</i>	+	+	r	.	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	.	.	.
<i>Helianthemum salicifolium</i>	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	+	+	+	+	+	+	+	+	+	+	+
<i>Aegilops triuncialis</i>	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	+	+	+	+	+
<i>Dasypyrum villosum</i>	+	.	.	.	+	+	+	.	.	+	+	+	+	.	.	.	+	+	+	+	.	.	+	.	r	.	
<i>Hypericum rumeliacum</i>	.	.	.	+	+	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.
<i>Fumana procumbens</i>	.	.	.	1	+	.	.	.	.	.	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.
<i>Helichrysum luteo-album</i>	.	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.
<i>Euphorbia myrsinites</i>	+	.	+	.	.	r	+	+	.	+	+	+	.	+	.	.	.	.	+	.	.	.	.	.	.	+	.
<i>Artemisia alba</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	2	.
Character and diagnostic taxa of class Festuco-Brometea																											
<i>Erysimum crassistylum</i>	.	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	+	.
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	.	+	.	.	+	+	+	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.
<i>Lomelosia argentea</i>	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
<i>Ononis pusilla</i>	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
<i>Melica ciliata</i>	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.
<i>Convolvulus cantabrica</i>	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
<i>Sedum urvillei</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
<i>Linum tenuifolium</i>	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
<i>Onobrychis arenaria</i> ssp. <i>lasiolepis</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Chondrilla juncea</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Alyssum montanum</i> ssp. <i>montanum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.
<i>Astragalus onobrychis</i>	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Sanguisorba minor</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sedum ochroleucum</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Character and diagnostic taxa of class Stellarietea mediae																											
<i>Bromus squarrosus</i>	.	.	.	+	.	.	.	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Avena sterilis</i>	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Bromus tectorum</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Euphorbia helioscopia</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Geranium rotundifolium</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Coronilla scorpioides</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Consolida regalis</i>	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cynodon dactylon</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 6: Relevés table of the *Artemisia campestris* - *Dasypyrum villosum* comm.

Relevé number	153	202	206	200	8	9	201	13	12	203	7	156	324	330	250	266	271	248	53
Relevé area (m ²)	40	40	40	40	50	50	40	50	40	40	50	40	30	30	30	30	30	30	40
Altitude (m)	630	610	660	600	575	575	605	580	575	640	595	600	595	600	605	580	590	580	630
Exposition	W	S	SE	SE	SE	S	S	-	-	S	SE	S	W	N	E	SE	E	E	E
Slope (%)	50	10	50	20	10	10	5	-	-	40	50	5	15	5	35	20	10	10	50
Cover tree layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover herb layer (%)	80	70	70	70	50	65	80	80	85	65	65	60	90	70	70	75	70	60	50
Locality	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Aspect (°)	270	180	135	135	135	180	180	-	-	180	135	180	270	360	90	135	90	90	90
Differential taxa																			
<i>Artemisia campestris</i>	3	3	2	4	3	3	3	4	3	3	3	4	4	3	3	3	3	3	2
<i>Dasypyrum villosum</i>	+	.	+	.	.	.	.	.	.	+	r	+	.	.	+	+	.	+	r
<i>Teucrium capitatum</i>	+	+	+	.	+	+	+	+	+	+	.	.	+	+	+	+	+	+	+
<i>Thymus sibthorpii</i>	+	.	+	.	+	.	.	.	.	+	+	.	.	.	.	+	l	+	.
<i>Koeleria macrantha</i>	+	.	+	.	.	+	+	.	.	+	.	+	+	+	+	+	+	+	.
<i>Eryngium campestre</i>	l	+	+	+	+	+	+	.	.	+	r	+	+	+	+	+	+	+	+
<i>Crupina crupinastrum</i>	.	+	+	+	.	.	+	.	.	+	.	+	+	.	+	+	+	+	+
<i>Erysimum crassistylum</i>	+	.	r	.	+	+	.	+	+	r	+	+	+	.	+	+	.	+	+
<i>Euphorbia myrsinites</i>	+	+	+	+	+	+	.	.	+	+	.	.	.	.	+	.	.	.	+
<i>Bothriochloa ischaemum</i>	.	+	2	l	.	+	l	.	+	+	+	l	.	.	l	+	r	.	.
<i>Stipa capillata</i>	2	l	+	+	+	.	l	r	r	+	r	.	.	+	.	.	.	.	.
<i>Avena sterilis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+
<i>Bromus tectorum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r
<i>Helianthemum salicifolium</i>	+	.	.	.	.	+	.	.	.	.	.	.	.	+	+	+	+	.	.
<i>Aegilops triuncialis</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Micromeria cremnophila</i>	.	.	.	.	+	.	.	.	.	+	+	.	.	.	+	.	.	.	r
<i>Helichrysum luteo-album</i>	.	.	.	+	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.
<i>Artemisia alba</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	+
<i>Marrubium peregrinum</i>	.	+	.	+	+	+	.	+	.	.	.	r	+	.	.	.	.	.	.
<i>Cynodon dactylon</i>	.	.	.	.	+	+	.	l	+	.	+	.	.	.	+	+	+	.	.
<i>Vulpia ciliata</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Anthemis arvensis</i> ssp. <i>incrassata</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Character and diagnostic taxa of class Festuco-Brometea																			
<i>Melica ciliata</i>	.	.	+	.	+	+	.	.	.	+	+	.	.	.	.	+	.	.	+
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	.	+	.	.	.	.	+	.	.	+	+	.	.	.	+	.	.	.	.
<i>Chondrilla juncea</i>	.	.	+	.	+	+	.	+	.	+	+	+	.	.	.	r	.	.	.
<i>Lomelosia argentea</i>	+	.	+	.	r	+	.	+	+	+	+	+	+	+	.	.	+	.	.
<i>Ononis pusilla</i>	.	.	.	.	.	.	.	.	.	.	r	.	.	+	+	+	.	.	r
<i>Chrysopogon gryllus</i>	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Satureja montana</i> ssp. <i>macedonica</i>	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.
<i>Herniaria incana</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Teucrium chamaedrys</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+
<i>Onobrychis arenaria</i> ssp. <i>lasiolepis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Thesium linophyllum</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Alyssum montanum</i> ssp. <i>montanum</i>	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Sedum urvillei</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Fumana procumbens</i>	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	+	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.

Relevé number	153	202	206	200	8	9	201	13	12	203	7	156	324	330	250	266	271	248	53	
<i>Convolvulus cantabrica</i>
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	+
<i>Astragalus onobrychis</i>
<i>Festuca valesiaca</i>	+	.	1	.	.	.	.	.	.
<i>Pilosella hoppeana</i>	+
<i>Sanguisorba minor</i>	+
<i>Galium verum</i>	+
<i>Securigera varia</i>	+
<i>Lactuca viminea</i>	+
<i>Linum tenuifolium</i>
<i>Eryngium amethystinum</i>
Character and diagnostic taxa of class <i>Stellarietea mediae</i>																				
<i>Consolida regalis</i>	r	+	r	.	r	+	.	.	r	.	+	.	.	.	.	.	.	.	.	.
<i>Lathyrus cicera</i>
<i>Bromus squarrosus</i>	+	+	.	+
<i>Euphorbia helioscopia</i>
<i>Geranium rotundifolium</i>
<i>Coronilla scorpioides</i>	+	.	.	.
<i>Caucalis platycarpus</i>
<i>Heliotropium europaeum</i>	+	.	.	+
<i>Fumaria officinalis</i> ssp. <i>officinalis</i>
<i>Veronica arvensis</i>	+
<i>Ajuga chamaepitys</i> ssp. <i>chia</i>
<i>Hordeum murinum</i>
Character and diagnostic taxa of class <i>Artemisietea vulgaris</i>																				
<i>Echinops sphaerocephalus</i> ssp. <i>albidus</i>	.	+	.	+	+	+	.	+	.	+	+	+	+
<i>Carthamus lanatus</i>	.	+	+	+
<i>Cichorium intybus</i>	.	+	.	.	.	+	+	.	.	+	r
<i>Picnemon acarna</i>	+
<i>Tragopogon dubius</i>
<i>Reseda lutea</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Character and diagnostic taxa of class <i>Asplenietea trichomanis</i>																				
<i>Aurinia saxatilis</i> ssp. <i>orientalis</i>	.	+	.	1	.	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.
<i>Inula verbascifolia</i> ssp. <i>aschersoniana</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Character and diagnostic taxa of class <i>Thlaspietea rotundifolii</i>																				
<i>Linaria simplex</i>	+	r
<i>Aethionema saxatile</i> ssp. <i>graecum</i>
Companion taxa																				
<i>Medicago minima</i>	+	.	1	1	1	1	.
<i>Silene conica</i>	+	+	+	.	.	+	.	r	.
<i>Acinos suaveolens</i>	+	.	+	.	+	+	+	+	.
<i>Arenaria serpyllifolia</i>	+	.
<i>Bromus intermedius</i>	r
<i>Leontodon crispus</i>	+	+	r	.
<i>Orlaya daucoides</i>	+	+
<i>Valerianella rimosa</i>	+	.	.	.	+
<i>Medicago tuberculata</i>	+	.	+	.	.
<i>Crepis sancta</i>	r	.	.	.	.
<i>Calamintha nepeta</i>	+
<i>Hippocrepis ciliata</i>	+	+	.	.	.
<i>Poa bulbosa</i>	+	.	+	+	.	.	.	+	.

Relevé number	153	202	206	200	8	9	201	13	12	203	7	156	324	330	250	266	271	248	53	
<i>Arrhenatherum palaestinum</i>
<i>Medicago monspeliaca</i>	+	.	.	+	.	.	.	
<i>Thesium humile</i>	+	.	+	+	+	+	.	.	.	
<i>Verbascum leucophyllum</i>	.	.	r	.	+	+	.	+	+	.	+	+	.	.	.	+	r	.	.	
<i>Xeranthemum inapertum</i>	+	+	.	+	.	l	+	+	.	+	.	+	+	+	.	+	+	.	.	
<i>Carlina corymbosa</i>	+	+	+	.	+	+	.	.	.	+	+	+	
<i>Petrorhagia illyrica</i> ssp. <i>illyrica</i>	+	.	.	+	.	.	+	+	+	.	.	+	+	.	.	
<i>Avena barbata</i> ssp. <i>barbata</i>	.	.	+	.	+	.	r	.	+	+	+	.	.	.	.	.	.	.	+
<i>Centaurea grisebachii</i>	+	+	+	r	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.
<i>Trifolium campestre</i>	+	
<i>Stachys iva</i>	r	+	
<i>Petrorhagia prolifera</i>	+	r	.	
<i>Brachypodium distachyon</i>	+	+	.	+	
<i>Lens nigricans</i>	+	+	+	+	
<i>Asperula aristata</i>	.	.	+	+	.	.	.	
<i>Achillea chrysocoma</i>	+	r	.	.	.	+	.	.	.	.	.	.	.
<i>Cruciata pedemontana</i>	
<i>Psilurus incurvus</i>	+	
<i>Crucianella graeca</i>	.	.	+	+	+	+	.	
<i>Erodium cicutarium</i>	r	.	.	.	
<i>Taraxacum</i> sp.	.	.	.	+	r	+	.	+	.	+	.	.	.	.	.	.	.	.	.
<i>Medicago orbicularis</i>	+	.	.	
<i>Linum bienne</i>	+	.	.	.	
<i>Astragalus sericophyllus</i>	+	.	
<i>Hypericum rumeliacum</i>	
<i>Potentilla recta</i>	+	+	.	
<i>Scabiosa webbiana</i>	+	
<i>Papaver rhoeas</i>	
<i>Petrorhagia thessala</i>	r	.	.	.	.	.	.	.	.	.	.	.
<i>Bromus cappadocicus</i>	
<i>Euphorbia taurinensis</i>	
<i>Echinops microcephalus</i>	.	+	+	+	
<i>Silene radicata</i>	+	+	
<i>Hypochaeris cretensis</i>	
<i>Phleum exaratum</i>	+	+	
<i>Betonica officinalis</i>	.	+	.	+	+	
<i>Minuartia verna</i> ssp. <i>collina</i>	.	+	+	.	.	+	
<i>Catapodium rigidum</i>	
<i>Centaurea salnitana</i>	+	+	+	

Taxa occurring in 1 or 2 relevés: *Cynosurus echinatus* (2), *Lathyrus saxatilis* (2), *Nigella damascena* (2), *Polygonum aviculare* ssp. *neglectum* (2), *Cuscuta epithymum* (2), *Trifolium scabrum* (2), *Minuartia hamata* (2), *Origanum vulgare* (1), *Paliurus spina-christi* (1), *Juniperus oxycedrus* (1), *Prunus webbii* (1), *Prospero autumnale* (1), *Salvia ringens* (1), *Paronychia macedonica* (1), *Polygala supina* ssp. *supina* (1), *Scandix australis* (1), *Alyssum corymbosoides* (1), *Astragalus monspessulanus* ssp. *monspessulanus* (1), *Pilosella bauhini* (1), *Medicago coronata* (1), *Clypeola jonthlaspi* ssp. *jonthlaspi* (1), *Festuca jeanpertii* (1), *Stipa bromoides* (1), *Sideritis montana* ssp. *montana* (1), *Centaurea graeca* (1), *Onosma heterophylla* (1), *Geranium purpureum* (1), *Asterolinon linum-stellatum* (1), *Achillea holosericea* (1), *Dianthus gracilis* ssp. *gracilis* (1), *Coronilla valentina* ssp. *glauca* (1), *Tragopogon porrifolius* (1).

Table 7: Relevés table of the *Stipa capillata* – *Koeleria macrantha* comm.

Relevé number	52	308	312	146	145	303	144	57	162	338	197	337	54	148	314	55	56	191
Relevé area (m ²)	40	20	20	40	40	20	40	40	40	20	40	20	40	40	30	40	40	40
Altitude (m)	590	690	580	620	650	735	670	675	670	690	780	665	675	590	610	690	690	670
Exposition	W	SW	W	-	E	NW	E	E	W	-	SE	SE	E	SW	S	E	E	SW
Slope (%)	35	30	40	-	40	40	25	75	60	-	60	60	75	25	40	70	80	30
Cover tree layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover herb layer (%)	80	30	35	70	40	45	30	40	45	60	30	50	35	60	60	40	40	40
Locality	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Aspect (°)	270	225	270	-	90	315	90	90	270	-	135	135	90	225	180	90	90	225
Differential taxa																		
<i>Stipa capillata</i>	+	r	+	.	.	+	.	+	.	+	.	.	.	.	+	.	+	+
<i>Chrysopogon gryllus</i>	.	.	+	.	+	+	r	r	.	+	.	+	.	.	.	.	.	.
<i>Bothriochloa ischaemum</i>	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.
<i>Teucrium capitatum</i>	+	.	+	+	.	.	+	.	.	+	+	+	+	.	+	+	+	+
<i>Thymus sibthorpii</i>	+	+	+	+	+	+	.	.	.	.	+	+	.	.	.	.	.	+
<i>Koeleria macrantha</i>	+	+	+	.	.	+	.	r	+	.	+	.	+	+	+	+	+	+
<i>Euphorbia myrsinites</i>	+	.	+	+	.	+	r	+	+	+	.	+	.	r	+	r	r	+
<i>Helianthemum salicifolium</i>	+	+	+	+	.	.	+	+	+	+	.	.	+	.	+	.	+	.
<i>Eryngium campestre</i>	.	.	.	.	.	.	.	.	+	.	.	+	.	+	.	.	.	.
<i>Asperula aristata</i>	+	+	.	.	.	+	r	+	.	.	+	.	.	.	+	+	+	.
<i>Crupina crupinastrum</i>	+	.	+	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.
<i>Fumana procumbens</i>	.	+	+	+	+	.	+	.	.	+	+	+	.	.	.	.	.	+
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	.	+	.	.	.	+	.	.	+	.	+	.	.	.	.	.	.	+
<i>Scabiosa webbiana</i>	.	.	.	.	.	+	.	+	+	+	.	+	r	.	+	+	+	+
<i>Helichrysum luteo-album</i>	.	.	+	.	.	.	.	.	r	.	.	.	.	.	+	.	.	.
<i>Astragalus sericophyllus</i>	.	.	.	r	.	+	.	+	+	.	r	.	+	.	.	r	+	+
<i>Hypericum rumeliacum</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
<i>Petrorhagia thessala</i>	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	.	+
<i>Inula verbascifolia</i> ssp. <i>aschersoniana</i>	+	.	.	.	.	.	+	.	+	.	.	.	r	r	r	r	r	.
<i>Stachys iva</i>	.	.	.	.	+	.	.	.	+	+	+	.	.	.	.	.	.	+
<i>Artemisia alba</i>	.	.	.	.	r	.	+	+	+	.	r	r	+	.	.	+	.	+
<i>Satureja montana</i> ssp. <i>macedonica</i>	.	.	r	r	.	+	+	+	.	.	.	.	r	.	.	.	.	.
Character and diagnostic taxa of class <i>Festuco-Brometea</i>																		
<i>Festuca valesiaca</i>	.	+	+	.	+	+	+	.	.	+	+	+	.	+	.	.	.	.
<i>Melica ciliata</i>	.	.	r	.	.	+	.	.	+	.	+	+	+	.	+	.	.	+
<i>Carex liparocarpos</i>	+	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.
<i>Eryngium amethystinum</i>	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.
<i>Ononis pusilla</i>	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	+
<i>Lomelosia argentea</i>	.	.	.	.	+	.	r	.	.	.	.	.	.	+	.	.	.	.
<i>Anthyllis vulneraria</i> ssp. <i>scardica</i>	.	.	+	.	.	+	.	.	.	+	+	+	.	.	+	.	.	.
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
<i>Sedum urvillei</i>	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.
<i>Linum tenuifolium</i>	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	+	.	.
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Artemisia campestris</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	+	r	.	.	.
<i>Sedum ochroleucum</i>	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
<i>Onobrychis arenaria</i> ssp. <i>lasiostachya</i>	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
<i>Jurinea mollis</i> ssp. <i>mollis</i>	.	.	.	.	r	.	.	.	r	.	r	.	.	.	.	.	.	.
<i>Convolvulus cantabrica</i>	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
<i>Sanguisorba minor</i>	.	.	.	.	.	.	.	r	.	.	.	.	.	+	.	.	.	.
<i>Muscari neglectum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Tabela 7: Tabela popisov združbe *Stipa capillata* – *Koeleria macrantha*.

158	232	307	204	99	207	157	17	168	316	151	208	159	160	161	198	163	164	170	192	50	245	253	209	210	211	241	244	313	
40	30	20	40	40	40	40	40	40	30	40	40	40	40	40	40	40	40	40	40	40	20	20	30	30	30	20	20	20	
610	770	700	650	550	660	610	600	740	645	615	670	590	650	655	820	685	700	670	680	620	600	640	580	585	580	590	595	590	
S	SE	W	SE	W	SE	E	S	E	S	W	SE	SW	SW	S	SE	W	SW	S	SW	E	S	E	W	SW	NW	S	SE	SW	
55	75	30	50	20	50	50	15	30	5	60	80	60	45	50	55	60	65	50	50	40	50	70	80	90	90	50	40	50	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	15	10	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
60	45	30	30	80	30	50	40	40	60	40	20	60	60	65	40	35	45	40	35	50	45	30	30	40	20	40	35	50	
P	P	P	P	V	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
180	135	270	135	270	135	90	180	90	180	270	135	225	225	180	135	270	225	180	225	90	180	90	270	225	315	180	135	225	
+	.	+	.	.	+	+	.	.	.	+	+	.	+	+	.	.	+	+	+	.	.	.	+	.	.	.	.	.	r
.	.	r	.	.	.	.	+	.	.	+	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	+
.	+	.	.	.	+	.	+	.	.	.	+	.	.	.	+	.	.	+	.	+	+	+	+	+	+
+	+	+	+	+	.	+	+	r	.	+	.	+	+	.	+	.	+	.	+	+	.	+	.	.	.	+	.	+	+
+	+	+	+	+	+	.	+	+	+	.	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	+
+	+	+	+	+	+	.	+	+	+	+	r	+	.	.	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+
+	.	.	.	+	+	.	+	+	+	+	.	.	+	+	+	+	+	+	+	.	.	+
+	.	+	.	+	+	+	+	.	+	r	+	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
.	+	.	.	+	+	.	+	.	+	r	+	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
.	+	.	.	+	+	.	+	.	+	+	+
.	+	.	.	.	.	.	+	.	.	r	.	.	+	+	.	+	.	.	.	.	.	+	.	.	.	.	.	.	+
.	+	+	+	.	+	+	.	.	+	+	+	+	+	+	.	+	.	.	+	+	+	+	.	.
+	+	.	+	+	+	.	+	r	.	.	.	r	+	+	+	r	r	.	+	.	.	.	.	.	.	.	.	.	.
.	+	+	+	.	+	+	.	+	.	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	.
.	.	.	.	.	+	.	+	.	+	+	r	.	.	.	.	.	.	.	.	.	.	r	+	.	.	.	.	.	.
.	r	+	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	r	r	.	.	.	.	.	.	.	.
+	.	+	.	+	.	+	.	+	+	+	+	+	.	.	+	.	.	r	.	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	+	.	+	+	+	.	.	.	+	+	.	+	r	+	+
.	.	+
.	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.
+	+	.	.	.	+	.	.	.	+	+
.	.	+	+	.	+	+
.	+	+
.	+
+	.	+	.	.	.	+	+	+	+
.	+	.	+
+	.	.	+	.	+	.	r	r	.	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	+	.	+	.	+
.
.	+	.	.	.	.	.	r	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.
.
.	.	.	.	+

Relevé number	52	308	312	146	145	303	144	57	162	338	197	337	54	148	314	55	56	191
<i>Allium paniculatum</i>
<i>Inula oculus-christi</i>
<i>Pilosella hoppeana</i>
<i>Allium moschatum</i>
<i>Helianthemum oelandicum</i> ssp. <i>canum</i>	.	+	.	.	.	+	+
<i>Alyssum montanum</i> ssp. <i>montanum</i>
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	+	.	.	r	+	.	.	.
<i>Astragalus onobrychis</i>
<i>Trinia glauca</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Galium verum</i>	+	r	+	.	.	.	.	.	.	.	.	.	+
<i>Herniaria incana</i>
<i>Teucrium chamaedrys</i>
<i>Thesium linophyllum</i>
<i>Teucrium montanum</i>
<i>Matthiola fruticulosa</i> ssp. <i>valesiaca</i>	.	.	.	+	.	r	.	.	.	.	r	.	.	.	.	.	.	.
<i>Cytisus procumbens</i>	+	+	r	.	.	.	.	.	.	.	.	.	.	.
<i>Erysimum crassistylum</i>	r	.
<i>Onosma visianii</i>
<i>Hippocrepis comosa</i>
<i>Phelipanche purpurea</i>
<i>Hypericum perforatum</i>	r	.	.	.	.	.
<i>Seseli pallasii</i>	+
<i>Bromus erectus</i>	+
Character and diagnostic Phanerophyte taxa of <i>Quercetea pubescentis</i>, <i>Rhamno-Prunetea</i> and <i>Quercetea ilicis</i>																		
<i>Juniperus oxycedrus</i>	.	.	.	r	r	r	.	r	.	.	.	.	.	.	.	.	.	r
<i>Asparagus acutifolius</i>
<i>Rhamnus alaternus</i> ssp. <i>alaternus</i>
<i>Prunus webbii</i>	r	.	.	.	.	.	.	.	.	.	.	.
<i>Phillyrea latifolia</i>
<i>Pistacia terebinthus</i> ssp. <i>terebinthus</i>
<i>Prunus spinosa</i>	r	.	.	.	.	.	.	.	.	.	.
<i>Rosa agrestis</i>
<i>Rubus sanctus</i>
<i>Paliurus spina-christi</i>
<i>Hippocrepis emerus</i> ssp. <i>emeroides</i>
<i>Carpinus orientalis</i>	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Character and diagnostic taxa of class <i>Stellarietea mediae</i>																		
<i>Euphorbia helioscopia</i>
<i>Geranium rotundifolium</i>
<i>Coronilla scorpioides</i>
<i>Bromus squarrosus</i>	+	+	+	.	.	.
<i>Cynodon dactylon</i>
<i>Consolida regalis</i>
<i>Avena sterilis</i>
<i>Bromus tectorum</i>
<i>Caucalis platycarpos</i>
<i>Ajuga chamaepitys</i> ssp. <i>chia</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Viola arvensis</i>
Character and diagnostic taxa of class <i>Asplenietea trichomanis</i>																		
<i>Achillea ageratifolia</i> ssp. <i>aizoon</i>	r	+	+	+	+	+	+	+	r	+	+	+	.	.	.	.	.	.
<i>Iris reichenbachii</i>
<i>Aurinia saxatilis</i> ssp. <i>orientalis</i>
<i>Campanula lingulata</i>

Relevé number	52	308	312	146	145	303	144	57	162	338	197	337	54	148	314	55	56	191
Character and diagnostic taxa of class <i>Thlaspietea rotundifolii</i>																		
<i>Linaria simplex</i>	+
<i>Vincetoxicum hirundinaria</i> ssp. <i>nivale</i>	+	+	r	.	.	.	.	.	.	.	.	.	.	.
<i>Aethionema saxatile</i> ssp. <i>graecum</i>
Character and diagnostic taxa of class <i>Artemisietea vulgaris</i>																		
<i>Cichorium intybus</i>
<i>Reseda lutea</i>
<i>Echinops sphaerocephalus</i> ssp. <i>albidus</i>	+
Companion taxa																		
<i>Centaurea grisebachii</i>	+	.	.	+	+	+	.	.	+	r	.	.	+
<i>Minuartia verna</i> ssp. <i>collina</i>	r	+	+	+	.	+	r	+	.	.	+	+	+	.	.	.	+	.
<i>Leontodon crispus</i>	+	+	+	+	+	r	+	+
<i>Acinos suaveolens</i>	r	.	r	+	+	+	.	.	+	.	.	+	+	+
<i>Poa bulbosa</i>	+	.	.	+	+	.	.	+	.	+	.	.	.
<i>Silene radicata</i>	+	.	.	.	+	.	+	.	+	+	.	.	+
<i>Xeranthemum inapertum</i>	.	.	+	+	+	+	.	+	+	.	.	.
<i>Thesium humile</i>	.	.	+	+	+	+	.	+	.	.	+	.	.	+
<i>Micromeria cremnophila</i>
<i>Allium stamineum</i>	.	.	+	.	.	+	+
<i>Hippocrepis ciliata</i>	r	.	+	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.
<i>Echinops microcephalus</i>	+
<i>Bromus intermedius</i>	.	.	+	+	+
<i>Dianthus gracilis</i> ssp. <i>gracilis</i>	.	+	.	.	.	+	.	.	.	+	.	+
<i>Silene conica</i>	r	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.
<i>Sideritis montana</i> ssp. <i>montana</i>	+
<i>Paronychia macedonica</i>	+	+	+	+	+	+	.	.	.	+	.	.	.
<i>Linum bienne</i>	+
<i>Bromus cappadocicus</i>	.	.	+	r	.	.	.	.	+	.	.	+	+	.
<i>Scorzonera mollis</i> ssp. <i>mollis</i>	r	.	.	.	+	.	.	.	.	.	.	.	.
<i>Asyneuma limonifolium</i> ssp. <i>limonifolium</i>	+	.	+	.	r	.	.	.	.
<i>Potentilla recta</i>	.	r	.	.	.	+	.	.	.	.	.	.	.	r	.	.	.	.
<i>Ornithogalum divergens</i>	+	.	.	r	.	.	.	.	.	+	.	.	.	.	+	.	.	.
<i>Salvia ringens</i>	+
<i>Erodium absinthoides</i>	+	.	+
<i>Onosma heterophylla</i>
<i>Asphodeline liburnica</i>
<i>Alyssum sibiricum</i>	+	.	+
<i>Petrorhagia illyrica</i> ssp. <i>illyrica</i>
<i>Stipa</i> cf. <i>endotricha</i>
<i>Fumana scoparia</i>	+
<i>Prospero autumnale</i>
<i>Anthericum liiagio</i>
<i>Bupleurum praealtum</i>
<i>Origanum vulgare</i>	+
<i>Valerianella rimosa</i>	+	.	.
<i>Medicago minima</i>	+	.	.
<i>Euphorbia taurinensis</i>
<i>Verbascum leucophyllum</i>	+	.	.
<i>Trifolium scabrum</i>
<i>Centaurea graeca</i>	.	.	+	r	.	.
<i>Bromus benekenii</i>
<i>Brachypodium distachyon</i>	+	.	.
<i>Cruciata pedemontana</i>

Relevé number	52	308	312	146	145	303	144	57	162	338	197	337	54	148	314	55	56	191
<i>Centaurea salonitana</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ranunculus sprunerianus</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Thesium macedonicum</i>	+
<i>Pyrus spinosa</i>
<i>Quercus trojana</i> ssp. <i>trojana</i>
<i>Potentilla detommasii</i>
<i>Verbascum graecum</i>	r	.	.	.	.	.
<i>Ptercephalus plumosus</i>
<i>Aegilops triuncialis</i>	r	.	.	.	.	.
<i>Cerastium brachypetalum</i> ssp. <i>roeseri</i>	+	.	+	.	+
<i>Podospermum laciniatum</i>
<i>Quercus trojana</i> ssp. <i>trojana</i>
<i>Medicago monspeliaca</i>
<i>Festuca jeanpertii</i>	+	+	.	.	+	+	.
<i>Dasypyrum villosum</i>	r	.	.	.	.	.
<i>Carlina corymbosa</i>	+
<i>Polygala supina</i> ssp. <i>supina</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Pilosella bauhini</i>	r	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lappula patula</i>	r	.
<i>Goniolimon heldreichii</i>
<i>Avena barbata</i> ssp. <i>barbata</i>
<i>Onobrychis gracilis</i>
<i>Bellardia latifolia</i>
<i>Catapodium rigidum</i>
<i>Thymus boissieri</i>
<i>Alyssum corymbosoides</i>	r	.	.	.	.	.
<i>Arrhenatherum palaestinum</i>
<i>Calamintha nepeta</i>
<i>Achillea fraasii</i>
<i>Stipa bromoides</i>
<i>Hieracium pannosum</i>
<i>Coronilla valentina</i> ssp. <i>glauca</i>	r	.	.	+	.	.	.	.	.	.	.	.	.	.
<i>Cerastium decalvans</i>	+	.	r	.	.	.	.	.	.	.	.	.	.
<i>Arenaria serpyllifolia</i>
<i>Anthemis arvensis</i> ssp. <i>incrassata</i>	.	.	.	+
<i>Plantago lanceolata</i>
<i>Dactylis glomerata</i>
<i>Campanula patula</i>
<i>Hornungia petraea</i>

Table 7: Continued

Relevé number	263	329	472	336	193	65	194	335	294	84	85	90	259	86	87	89	88	91
Relevé area (m ²)	20	20	40	20	40	100	40	20	20	50	50	60	30	50	50	50	50	50
Altitude (m)	700	690	570	660	700	595	720	655	630	680	685	685	730	680	685	690	680	590
Exposition	S	E	E	SE	W	E	E	SE	SE	N	NE	SE	SE	E	E	SE	NE	W
Slope (%)	20	50	60	40	60	60	60	35	30	20	15	10	40	15	10	10	25	50
Cover tree layer (%)	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
Cover shrub layer (%)	-	-	-	-	-	25	-	-	-	50	40	40	-	30	60	50	40	10
Cover herb layer (%)	40	45	40	50	30	40	40	50	40	50	60	50	80	70	40	40	40	60
Locality	P	P	V	P	P	V	P	P	P	V	V	V	P	V	V	V	V	V
Aspect (°)	180	90	90	135	270	90	90	135	135	360	45	135	135	90	90	135	45	270
Differential taxa																		
<i>Stipa capillata</i>	+	r	.	.	+	.	.	.	.	1	2	2	.	2	2	1	2	1
<i>Chrysopogon gryllus</i>	.	r	+	r	.	+	r	.	+	1	1	+	3	1	1	2	+	.
<i>Bothriochloa ischaemum</i>	+	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	1
<i>Teucrium capitatum</i>	.	+	+	.	+	+	+	+	.	+	+	+	+	+	+	+	+	+
<i>Thymus sibthorpii</i>	+	.	.	+	+	+	.	+	+	1	+	1	1	1	1	+	+	1
<i>Koeleria macrantha</i>	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+
<i>Euphorbia myrsinites</i>	.	+	+	+	r	.	.	+	+	+	+	+	r	+	+	+	+	+
<i>Helianthemum salicifolium</i>	.	+	+	+	.	.	.	+	+	+	+	+	.	+	+	+	.	.
<i>Eryngium campestre</i>	.	.	.	.	.	.	.	.	.	+	+	+	.	+	+	+	+	+
<i>Asperula aristata</i>	.	+	+	+	.	.	+	.	.	+	+	+	+	+	.	.	+	+
<i>Crupina crupinastrum</i>	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+	+	+	+
<i>Fumana procumbens</i>	.	+	+	+	+	.	+	+	.	.	.	.	1	.	+	.	+	.
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	+	.	.	.	+	+	.	+	+	.	.	+	+	.	.	.	.	.
<i>Scabiosa webbiana</i>	.	.	.	+	.	.	.	.	.	.	.	+	+	.	.	.	+	.
<i>Helichrysum luteo-album</i>	.	+	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	+
<i>Astragalus sericophyllus</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
<i>Hypericum rumeliacum</i>	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	.	.	.
<i>Petrorhagia thessala</i>	.	.	+	+	+	+	+	.	.	.	+	+	.	+	.	.	+	+
<i>Inula verbascifolia</i> ssp. <i>aschersoniana</i>	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
<i>Stachys iva</i>	+	.	+	.	+	.	+	+	.	.	.	.	+	.	.	.	.	.
<i>Artemisia alba</i>	.	.	.	.	+	.	+	r	.	.	.	.	+	.	.	.	.	.
<i>Satureja montana</i> ssp. <i>macedonica</i>	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Character and diagnostic taxa of class <i>Festuco-Brometea</i>																		
<i>Festuca valesiaca</i>	.	+	.	+	+	+	+	.	+	+	+	.	.	.	.	.	.	.
<i>Melica ciliata</i>	+	+	.	+	+	.	+	+	+	+	+	+	.	+	+	+	+	+
<i>Carex liparocarpos</i>	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.	+	+	+
<i>Eryngium amethystinum</i>	.	r	+	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.
<i>Ononis pusilla</i>	+	+	.	.	.	.	.	+	.	.	r	.	+	+	+	.	.	.
<i>Lomelosia argentea</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Anthyllis vulneraria</i> ssp. <i>scardica</i>	.	+	+	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	+	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.
<i>Sedum urvillei</i>	+	.	.	+	.	+	.	.	+	+	.	.	.	.	.	+	.	+
<i>Linum tenuifolium</i>	.	+	.	+	+	+	.	.	.	.	.	.	.	.	+	+	+	+
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+
<i>Artemisia campestris</i>	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sedum ochroleucum</i>	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Onobrychis arenaria</i> ssp. <i>lasioleuca</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Jurinea mollis</i> ssp. <i>mollis</i>	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.
<i>Convolvulus cantabrica</i>	.	.	+	+	+	.	.	r	.	.	.	.	.	.	.	.	.	.
<i>Sanguisorba minor</i>	.	.	.	.	.	.	.	r	.	.	.	.	+	.	.	.	.	+
<i>Muscari neglectum</i>	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.

Tabela 7: Nadaljevanje

92	100	102	26	83	154	205	296	149	150	285	214	302	295	176	177	43	47	173	183	305	281	199	174	172	282	181	311	182	
50	40	40	80	50	40	40	30	40	40	30	30	30	30	40	40	40	40	40	40	30	30	40	40	40	30	40	30	40	
570	555	560	670	690	630	650	595	595	600	710	770	735	590	620	635	530	530	600	615	715	715	800	605	630	715	590	620	600	
W	NW	NW	W	W	SW	SE	NW	SW	SW	NE	W	N	NW	NW	N	E	W	NW	NW	N	E	S	NW	SE	E	NW	E	-	
50	15	15	50	35	55	50	20	50	55	15	50	30	15	50	45	30	50	40	10	5	10	40	40	50	5	20	60	-	
-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	5	10	10	30	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
60	75	75	75	60	60	25	80	50	45	90	40	100	75	60	55	85	50	80	90	70	75	40	75	80	90	90	90	60	95
V	V	V	V	V	P	P	P	P	P	P	P	P	P	P	P	V	V	P	P	P	P	P	P	P	P	P	P	P	P
270	315	315	270	270	225	135	315	225	225	45	270	360	315	315	360	90	270	315	315	360	90	180	315	135	90	315	90	-	
+	2	3	+	1	1	1	.	.	.	1	2	3	.	+	+	2	3	1	3	2	+	+	3	.	.	4	+	4	
.	.	.	+	2	2	.	4	2	2	2	.	+	+	.	.	.	.	+	+	1	4	2	.	r	4	.	1	.	
1	1	1	.	.	.	+	.	.	.	+	.	.	+	.	.	2	+	+	.	.	.	+	.	4	r	.	2	.	
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1	+	+	+	.	+	+	+	+	+	
1	+	+	+	+	+	+	+	+	1	+	1	+	1	+	+	.	.	.	.	+	1	+	+	+	+	+	.	.	
+	.	+	+	+	+	+	+	+	+	+	.	+	.	+	+	+	+	+	+	+	+	+	+	+	.	+	.	+	+
+	+	.	.	+	+	+	+	+	+	.	+	.	.	r	+	.	.	r	.	+	.	+	+	+	.	.	r	+	+
.	+	.	+	+	+	.	+	+	.	.	+	+	+	.	.	+	+	+	+	.	+	+	.	+
+	+	+	.	.	+	+	+	+	+	+	.	+	+	+	+	.	.	.	.	+	.	.	r	+	.	+	.	+	+
+	+	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+	.	.	.	+	+	+	+	+	+
+	+	+	.	+	.	.	.	+	+	+	+	.	+	+	+	+	.	+
.	.	+	+	+	.	+	+	1	+	.	.	.	+	1	1	+	+	+	+	.	.	.	.	.	.	.	.	+	.
.	+	.	+	.	+	+	.	+	+	+	.	+	+	+	+	.	.	+	.	+	.	.	.	+	.	+	.	.	.
.	+	+	+	+	+	+	+	.	.	+	+	.	.	.	+	.	+	+	+	+	+
.	+	.	+	.	.	.	+	+	+	+	.
.	+	.	.	.	+	.	.	+	+	.	.	+	.	.	+	+	+	+	.
+	+	.	+	+	+	+	+
.
.	.	.	1	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	+	1	.	.	+	+	+	+	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
.	.	.	.	+	.	+	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.
.	+	+	1	.	+	.	.	+	+	.	.	+	.	+	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.
+	+	+	+	.	+	+	+	+	.	+	.	+	+	+	+
.	+	+	+	.	.	.	+
.	.	+	+	.	.	.	.	.	.	.	r	.	+	r	+	+	+	+	+	.	.	.	.	.	.	.	.	.	r
.	.	.	r	.	.	+	+	+	.	+	.	+	+	.	.	.	.	.	+	.	.	.	+	+	.	+	+	+	.
.	.	.	.	.	+	+	+	+	r	r	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+
.
.
.
.	+	+	+	+	.	.	+	+	+	+	+	+	.	+	+	+	+
.	.	+

Relevé number	263	329	472	336	193	65	194	335	294	84	85	90	259	86	87	89	88	91
<i>Allium paniculatum</i>	+	.	.	+	+
<i>Inula oculus-christi</i>
<i>Pilosella hoppeana</i>	+
<i>Allium moschatum</i>
<i>Helianthemum oelandicum</i> ssp. <i>canum</i>	+	+
<i>Alyssum montanum</i> ssp. <i>montanum</i>	.	+	+
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	.	+
<i>Astragalus onobrychis</i>
<i>Trinia glauca</i>	+
<i>Galium verum</i>
<i>Herniaria incana</i>
<i>Teucrium chamaedrys</i>	+	.	.	+
<i>Thesium linophyllon</i>
<i>Teucrium montanum</i>
<i>Matthiola fruticulosa</i> ssp. <i>valesiaca</i>	+
<i>Cytisus procumbens</i>
<i>Erysimum crassistylum</i>	+	.	+	+	+
<i>Onosma visianii</i>
<i>Hippocrepis comosa</i>
<i>Phelipanche purpurea</i>
<i>Hypericum perforatum</i>
<i>Seseli pallasii</i>
<i>Bromus erectus</i>
Character and diagnostic Phanerophyte taxa of <i>Quercetea pubescentis</i>, <i>Rhamno-Prunetea</i> and <i>Quercetea ilicis</i>																		
<i>Juniperus oxycedrus</i>	r	.	.	.	.	+	r	.	.	2	2	2	r	2	3	3	2	r
<i>Asparagus acutifolius</i>	+	+	+	.	+	+	.	r	.
<i>Rhamnus alaternus</i> ssp. <i>alaternus</i>	r	+	r	+	.
<i>Prunus webbii</i>	r	.	.	.	.	.	.	.	.	.	.	.
<i>Phillyrea latifolia</i>	+	r	+	.
<i>Pistacia terebinthus</i> ssp. <i>terebinthus</i>
<i>Prunus spinosa</i>	.	.	+	.	.	+
<i>Rosa agrestis</i>
<i>Rubus sanctus</i>	r	.
<i>Paliurus spina-christi</i>	+	.	+	.	+	+	r	.	.
<i>Hippocrepis emerus</i> ssp. <i>emeroides</i>
<i>Carpinus orientalis</i>	+	r	.	.	.	.	.	.	.
Character and diagnostic taxa of class <i>Stellarietea mediae</i>																		
<i>Euphorbia helioscopia</i>
<i>Geranium rotundifolium</i>
<i>Coronilla scorpioides</i>
<i>Bromus squarrosus</i>	.	.	.	+	.	.	.	+	+	+
<i>Cynodon dactylon</i>	+
<i>Consolida regalis</i>
<i>Avena sterilis</i>	+
<i>Bromus tectorum</i>
<i>Caucalis platycarpus</i>
<i>Ajuga chamaepitys</i> ssp. <i>chia</i>	.	+
<i>Viola arvensis</i>
Character and diagnostic taxa of class <i>Asplenietea trichomanis</i>																		
<i>Achillea ageratifolia</i> ssp. <i>aizoon</i>	.	+	+	+	+	+
<i>Iris reichenbachii</i>	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.
<i>Aurinia saxatilis</i> ssp. <i>orientalis</i>
<i>Campanula lingulata</i>

Relevé number	263	329	472	336	193	65	194	335	294	84	85	90	259	86	87	89	88	91
Character and diagnostic taxa of class <i>Thlaspietea rotundifolii</i>																		
<i>Linaria simplex</i>
<i>Vincetoxicum hirsutinaria</i> ssp. <i>nivale</i>	.	.	r	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Aethionema saxatile</i> ssp. <i>graecum</i>
Character and diagnostic taxa of class <i>Artemisietea vulgaris</i>																		
<i>Cichorium intybus</i>
<i>Reseda lutea</i>
<i>Echinops sphaerocephalus</i> ssp. <i>albidus</i>	.	.	r	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Companion taxa																		
<i>Centaurea grisebachii</i>	.	+	+	.	+	.	+	.	.	+	+	+	.	+	+	+	+	+
<i>Minuartia verna</i> ssp. <i>collina</i>	.	+	+	+	.	.	.	+	+	+	+	.	.	+	+	+	.	+
<i>Leontodon crispus</i>	+	.	+	.	.	.	+	.	.	+	.	+	.	+	+	.	.	+
<i>Acinos suaveolens</i>	+	.	.	+	+	.	.	+	+	.
<i>Poa bulbosa</i>	.	+	+	+	.	+	.	+	+	+	.	.	+
<i>Silene radicata</i>	.	+	.	+	.	.	.	+	r	.	.	+
<i>Xeranthemum inapertum</i>	.	+	+	r	.	+	.	.	.	.	.	+
<i>Thesium humile</i>	.	.	+	+	.	+	.	+	+
<i>Micromeria cremonophila</i>	+	+	+	+	+	+	+	+	+	+
<i>Allium stamineum</i>	.	+
<i>Hippocrepis ciliata</i>	.	+	.	+	.	.	.	+	+
<i>Echinops microcephalus</i>
<i>Bromus intermedius</i>	.	+	+
<i>Dianthus gracilis</i> ssp. <i>gracilis</i>
<i>Silene conica</i>	.	+	+	+
<i>Sideritis montana</i> ssp. <i>montana</i>	.	+	.	+	.	.	.	+	+	.	.	+	.	+	.	+	+	+
<i>Paronychia macedonica</i>	+	+	+	+	+	+	+	+	+	+	.	.	.
<i>Linum bienne</i>	+
<i>Bromus cappadocicus</i>	.	.	+
<i>Scorzonera mollis</i> ssp. <i>mollis</i>	+	+	+
<i>Asyneuma limonifolium</i> ssp. <i>limonifolium</i>
<i>Potentilla recta</i>	.	+	+	+
<i>Ornithogalum divergens</i>	.	+	.	+	.	.	.	+	+
<i>Salvia ringens</i>	+
<i>Erodium absinthoides</i>	.	+	.	+	.	.	.	+
<i>Onosma heterophylla</i>	.	.	+	.	+	+	.	r	.	.	.	.	.	.	.	.	.	.
<i>Asphodeline liburnica</i>	+	+	+	.	+	r	+	+	l
<i>Alyssum sibiricum</i>	+
<i>Petrorhagia illyrica</i> ssp. <i>illyrica</i>	+	.	r	+	+	.	.	.	.	.	.	.
<i>Stipa</i> cf. <i>endotricha</i>	+	+
<i>Fumana scoparia</i>
<i>Prospero autumnale</i>
<i>Anthericum liliago</i>	l	.	.	.	.	.
<i>Bupleurum praealtum</i>
<i>Origanum vulgare</i>
<i>Valerianella rimosa</i>	+
<i>Medicago minima</i>	.	+	+
<i>Euphorbia taurinensis</i>
<i>Verbascum leucophyllum</i>	.	.	r	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.
<i>Trifolium scabrum</i>	.	+	.	+	.	.	.	+
<i>Centaurea graeca</i>	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Bromus benekenii</i>
<i>Brachypodium distachyon</i>	+
<i>Cruciata pedemontana</i>	.	+	+

Relevé number	263	329	472	336	193	65	194	335	294	84	85	90	259	86	87	89	88	91
<i>Centaurea salonitana</i>	+
<i>Ranunculus sprunerianus</i>
<i>Thesium macedonicum</i>
<i>Pyrus spinosa</i>	r	r	.	.	.	.	.	.	r
<i>Quercus trojana</i> ssp. <i>trojana</i>	+	+	+	+	.
<i>Potentilla detommasii</i>	+	+	.	.	.
<i>Verbascum graecum</i>	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Pterocephalus plumosus</i>
<i>Aegilops triuncialis</i>	+
<i>Cerastium brachypetalum</i> ssp. <i>roeseri</i>
<i>Podospermum laciniatum</i>	+	.	.	+	+	+	.	.
<i>Quercus trojana</i> ssp. <i>trojana</i>
<i>Medicago monspeliaca</i>
<i>Festuca jeanpertii</i>
<i>Dasypyrum villosum</i>
<i>Carlina corymbosa</i>
<i>Polygala supina</i> ssp. <i>supina</i>	+
<i>Pilosella bauhini</i>
<i>Lappula patula</i>
<i>Goniolimon heldreichii</i>
<i>Avena barbata</i> ssp. <i>barbata</i>
<i>Onobrychis gracilis</i>	r	.	.	.	+	.	.	r	.
<i>Bellardia latifolia</i>
<i>Catapodium rigidum</i>	+
<i>Thymus boissieri</i>
<i>Alyssum corymbosoides</i>
<i>Arrhenatherum palaestinum</i>
<i>Calamintha nepeta</i>
<i>Achillea fraasii</i>
<i>Stipa bromoides</i>	+	.	+
<i>Hieracium pannosum</i>
<i>Coronilla valentina</i> ssp. <i>glauca</i>
<i>Cerastium decalvans</i>
<i>Arenaria serpyllifolia</i>
<i>Anthemis arvensis</i> ssp. <i>incrassata</i>
<i>Plantago lanceolata</i>	r	+	+	.	+	.	.	.	.
<i>Dactylis glomerata</i>	+	.	+
<i>Campanula patula</i>
<i>Hornungia petraea</i>

Table 7: Continued

Relevé number	175	179	180	178	186	317	306	184	185	331	327	326	328	342	340	339	333	343	
Relevé area (m _l)	40	40	40	40	40	30	30	40	40	30	30	30	30	30	30	30	30	30	
Altitude (m)	610	630	620	650	625	670	710	625	630	610	665	655	680	655	685	685	635	620	
Exposition	W	NW	NW	NW	NW	NW	W	W	N	N	N	N	N	W	NW	NW	N	W	
Slope (%)	35	30	35	45	35	55	10	20	40	40	50	50	50	45	50	50	35	50	
Cover tree layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cover shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cover herb layer (%)	70	65	70	90	85	60	75	85	80	40	60	60	65	80	80	95	100	90	
Locality	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
Aspect (°)	270	315	315	315	315	315	270	270	360	360	360	360	360	270	315	315	360	270	
Differential taxa																			
<i>Stipa capillata</i>	3	2	2	1	2	+	2	4	3	.	.	+	.	2	1	4	3	+	
<i>Chrysopogon gryllus</i>	r	.	+	2	+	+	1	+	.	.	.	+	.	.	.	.	.	+	3
<i>Bothriochloa ischaemum</i>	1	.	.	1	.	.	.	.	.	.	.	.	.	+	.	.	.	.
<i>Teucrium capitatum</i>	r	+	+	+	+	+	+	1	+	+	.	+	+	+	+	+	1	+	+
<i>Thymus sibthorpii</i>	.	+	+	.	.	.	+	+	+	+	+	.	.	.	.	+	.	+	.
<i>Koeleria macrantha</i>	+	+	+	+	.	+	+	+	+	+	+	+	+	.	.	.	.	+	.
<i>Euphorbia myrsinites</i>	+	+	+	r	+	+	.	.	r	+	.	.	.	.	.	.	+	.	.
<i>Helianthemum salicifolium</i>	+	+	+	+	+	.	+	+	+	.	.	+	.	.	.	+	.	.	.
<i>Eryngium campestre</i>	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
<i>Asperula aristata</i>	+	+	+	+	+	+	+	+	+	+	+	.	.	+	+	.	+	.	.
<i>Crupina crupinastrum</i>	+	.	+	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	+
<i>Fumana procumbens</i>	.	+	.	+	.	+	.	+	+	+	.	.	+	.	.	.	+	+	.
<i>Asperula purpurea</i> ssp. <i>purpurea</i>	.	.	.	.	+	+	+	.	.	.	.	+	.	.	.	.	.	.	.
<i>Scabiosa webbiana</i>	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	.	+	+
<i>Helichrysum luteo-album</i>	+	+	+	.	.	+	+	.	.	.	.	+	.	.	.	.	.	+	+
<i>Astragalus sericophyllus</i>	.	.	+	.	+	+	+	+	+	.	.	.	+	.	+	+	.	.	.
<i>Hypericum rumeliacum</i>	.	+	+	.	.	+	+	.	.	+	.	+	.	.	.	.	.	.	.
<i>Petrorhagia thessala</i>	+	+	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.
<i>Inula verbascifolia</i> ssp. <i>aschersoniana</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Stachys iva</i>	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.
<i>Artemisia alba</i>	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Satureja montana</i> ssp. <i>macedonica</i>	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Character and diagnostic taxa of class <i>Festuco-Brometea</i>																			
<i>Festuca valesiaca</i>	+	+	1	.	.	+	+	.	.	.	.	1	+	+	1	1	+	.	.
<i>Melica ciliata</i>	.	.	+	+	+	.	.	.	+	.	+	+	+	+	+	+	.	.	.
<i>Carex liparocarpos</i>	.	.	+	1	.	+	.	+	+	.	.	+	.	.	.	.	+	+	+
<i>Eryngium amethystinum</i>	+	+	+	+	1	.	.	.	.	.	+	+	+	+	+	+	+	+	r
<i>Ononis pusilla</i>	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	+
<i>Lomelosia argentea</i>	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
<i>Anthyllis vulneraria</i> ssp. <i>scardica</i>	.	.	.	.	.	+	+	.	.	.	.	+	+	+	+	+	+	1	1
<i>Minuartia glomerata</i> ssp. <i>macedonica</i>	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.
<i>Sedum urvillei</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
<i>Linum tenuifolium</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
<i>Helianthemum nummularium</i> ssp. <i>nummularium</i>	.	.	.	+	+	+	.	+	+	.	.	.	.	+	.	.	.	.	.
<i>Artemisia campestris</i>	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sedum ochroleucum</i>	.	+	.	+	+	+	.	+	.	+	+	+	+	+	.	.	.	.	.
<i>Onobrychis arenaria</i> ssp. <i>lasioleuca</i>	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	+	.	+
<i>Jurinea mollis</i> ssp. <i>mollis</i>	.	.	.	.	.	.	r	.	.	+	.	.	.	.	.	.	+	+	.
<i>Convolvulus cantabrica</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Sanguisorba minor</i>	.	+	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	+
<i>Muscari neglectum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Relevé number	175	179	180	178	186	317	306	184	185	331	327	326	328	342	340	339	333	343
<i>Allium paniculatum</i>
<i>Inula oculus-christi</i>	r	.	.	+	.	+	+	r	r	.
<i>Pilosella hoppeana</i>	+	+	+	.
<i>Allium moschatum</i>	.	+	.	+	.	.	.	+	+
<i>Helianthemum oelandicum</i> ssp. <i>canum</i>	+	+	.	.	+	+	+	+	+	+	+	+	+
<i>Alyssum montanum</i> ssp. <i>montanum</i>
<i>Allium sphaerocephalon</i> ssp. <i>sphaerocephalon</i>	+	+
<i>Astragalus onobrychis</i>
<i>Trinia glauca</i>
<i>Galium verum</i>
<i>Herniaria incana</i>
<i>Teucrium chamaedrys</i>
<i>Thesium linophyllum</i>
<i>Teucrium montanum</i>
<i>Matthiola fruticulosa</i> ssp. <i>valesiaca</i>	+
<i>Cytisus procumbens</i>
<i>Erysimum crassistylum</i>
<i>Onosma visianii</i>	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hippocrepis comosa</i>	+
<i>Phelipanche purpurea</i>
<i>Hypericum perforatum</i>
<i>Seseli pallasii</i>	r	+	.
<i>Bromus erectus</i>
Character and diagnostic Phanerophyte taxa of <i>Quercetea pubescentis</i>, <i>Rhamno-Prunetea</i> and <i>Quercetea ilicis</i>																		
<i>Juniperus oxycedrus</i>	r	.	.	.	.	.	.	.	.	.	.	.	.
<i>Asparagus acutifolius</i>
<i>Rhamnus alaternus</i> ssp. <i>alaternus</i>
<i>Prunus webbii</i>
<i>Phillyrea latifolia</i>
<i>Pistacia terebinthus</i> ssp. <i>terebinthus</i>
<i>Prunus spinosa</i>
<i>Rosa agrestis</i>
<i>Rubus sanctus</i>
<i>Paliurus spina-christi</i>
<i>Hippocrepis emerus</i> ssp. <i>emeroides</i>
<i>Carpinus orientalis</i>
Character and diagnostic taxa of class <i>Stellarietea mediae</i>																		
<i>Euphorbia helioscopia</i>
<i>Geranium rotundifolium</i>
<i>Coronilla scorpioides</i>
<i>Bromus squarrosus</i>	.	+
<i>Cynodon dactylon</i>
<i>Consolida regalis</i>
<i>Avena sterilis</i>
<i>Bromus tectorum</i>
<i>Caucalis platycarpus</i>
<i>Ajuga chamaepitys</i> ssp. <i>chia</i>
<i>Viola arvensis</i>
Character and diagnostic taxa of class <i>Asplenietea trichomanis</i>																		
<i>Achillea ageratifolia</i> ssp. <i>aizoon</i>	.	.	.	+	+	+	.	+	+	.	.	.	+	.
<i>Iris reichenbachii</i>
<i>Aurinia saxatilis</i> ssp. <i>orientalis</i>
<i>Campanula lingulata</i>

Relevé number	175	179	180	178	186	317	306	184	185	331	327	326	328	342	340	339	333	343
Character and diagnostic taxa of class Thlaspietea rotundifolii																		
<i>Linaria simplex</i>	+	+	.	.	.	+
<i>Vincetoxicum hirundinaria</i> ssp. <i>nivale</i>	+	.
<i>Aethionema saxatile</i> ssp. <i>graecum</i>
Character and diagnostic taxa of class Artemisietea vulgaris																		
<i>Cichorium intybus</i>
<i>Reseda lutea</i>	r	.	.	.	.	.	.	.	.
<i>Echinops sphaerocephalus</i> ssp. <i>albidus</i>
Companion taxa																		
<i>Centaurea grisebachii</i>	+	+	+	+	+	+	.	+	.	+	+	+	+	+	+	.	.	+
<i>Minuartia verna</i> ssp. <i>collina</i>	+	+	+	.	+	+	+	.	+	+	+	+	+	+	+	+	+	+
<i>Leontodon crispus</i>	.	+	+	.	.	+	+	+	.	+	+	+	.	+	+	.	.	.
<i>Acinos suaveolens</i>	+	+
<i>Poa bulbosa</i>	+	.	+	.	+	+	+	+	.	+	+	+	+	.	.	+	.	+
<i>Silene radicata</i>	.	+	.	.	+	+	.	+	+	+
<i>Xeranthemum inapertum</i>	+	+	+	+	.
<i>Thesium humile</i>	+	+	.	.	.	+	+	+	+	+	+	+	+
<i>Micromeria cremnophila</i>
<i>Allium stamineum</i>	+	+	.	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+
<i>Hippocrepis ciliata</i>	+	.	.	+	.	.	.	+	+	+	.	+
<i>Echinops microcephalus</i>	+	+	+	+	+	r	+	+	+	.	.	.	.	.	.	.	.	.
<i>Bromus intermedius</i>	+	+
<i>Dianthus gracilis</i> ssp. <i>gracilis</i>	.	.	+	+	+	.	.	.	+	.	+	.	+	+	.	+	+	+
<i>Silene conica</i>	.	+	+	+	+	.	+	+	.	+	.
<i>Sideritis montana</i> ssp. <i>montana</i>	.	+
<i>Paronychia macedonica</i>
<i>Linum bienne</i>	+	+
<i>Bromus cappadocicus</i>	+	.	.	+
<i>Scorzonera mollis</i> ssp. <i>mollis</i>	+	.	+	.	+	.	.	+	.	.	+	+	+	+	+	r	+	.
<i>Asyneuma limonifolium</i> ssp. <i>limonifolium</i>	.	+	.	+	.	.	+	+	.	.	+	.	+	+	+	+	+	+
<i>Potentilla recta</i>	+	+	+	.
<i>Ornithogalum divergens</i>	+	+	+	+	+	.	+	.	+
<i>Salvia ringens</i>	r	l	.	.	l	.	r	.	.	.	.	r	.
<i>Erodium absinthoides</i>	+	+	+	r	+	.	.	.	.	.	+	+	+	+	r	.	.	.
<i>Onosma heterophylla</i>	+
<i>Asphodeline liburnica</i>
<i>Alyssum sibiricum</i>
<i>Petrorhagia illyrica</i> ssp. <i>illyrica</i>
<i>Stipa</i> cf. <i>endotricha</i>	1	2	2	.	.	.	.	.
<i>Fumana scoparia</i>	+
<i>Prospero autumnale</i>	.	+	+	.	+	.	.	+	+
<i>Anthericum liliago</i>	+	+	.	.	.	+	+	.	.
<i>Bupleurum praealtum</i>
<i>Origanum vulgare</i>
<i>Valerianella rimosa</i>
<i>Medicago minima</i>	+
<i>Euphorbia taurinensis</i>
<i>Verbascum leucophyllum</i>
<i>Trifolium scabrum</i>
<i>Centaurea graeca</i>
<i>Bromus benekenii</i>
<i>Brachypodium distachyon</i>
<i>Cruciata pedemontana</i>

Relevé number	175	179	180	178	186	317	306	184	185	331	327	326	328	342	340	339	333	343
<i>Centaurea salonitana</i>
<i>Ranunculus sprunerianus</i>	+
<i>Thesium macedonicum</i>	+
<i>Pyrus spinosa</i>
<i>Quercus trojana</i> ssp. <i>trojana</i>
<i>Potentilla detommasii</i>
<i>Verbascum graecum</i>
<i>Ptercephalus plumosus</i>
<i>Aegilops triuncialis</i>
<i>Cerastium brachypetalum</i> ssp. <i>roeseri</i>
<i>Podospermum laciniatum</i>
<i>Quercus trojana</i> ssp. <i>trojana</i>
<i>Medicago monspeliaca</i>	+	.	.	.	+
<i>Festuca jeanpertii</i>
<i>Dasypyrum villosum</i>
<i>Carlina corymbosa</i>
<i>Polygala supina</i> ssp. <i>supina</i>
<i>Pilosella bauhini</i>	+
<i>Lappula patula</i>
<i>Goniolimon heldreichii</i>	r	.	.	.
<i>Avena barbata</i> ssp. <i>barbata</i>
<i>Onobrychis gracilis</i>
<i>Bellardia latifolia</i>	+	+
<i>Catapodium rigidum</i>
<i>Thymus boissieri</i>	1	.	.	.	.	.	.	.	.	.	.	.	.
<i>Alyssum corymbosoides</i>
<i>Arrhenatherum palaestinum</i>
<i>Calamintha nepeta</i>
<i>Achillea fraasii</i>	+	+
<i>Stipa bromoides</i>
<i>Hieracium pannosum</i>	+
<i>Coronilla valentina</i> ssp. <i>glauca</i>
<i>Cerastium decalvans</i>
<i>Arenaria serpyllifolia</i>
<i>Anthemis arvensis</i> ssp. <i>incrassata</i>
<i>Plantago lanceolata</i>
<i>Dactylis glomerata</i>
<i>Campanula patula</i>
<i>Hornungia petraea</i>

Taxa occurring in 1 or 2 relevés: *Minuartia hamata* (2), *Orlaya daucooides* (2), *Crepis sancta* (2), *Psilurus incurvus* (2), *Phleum exaratum* (2), *Tragopogon porrifolius* (2), *Asterolinon linum-stellatum* (2), *Achillea holosericea* (2), *Valerianella carinata* (2), *Medicago medicaginoides* (2), *Scabiosa triniifolia* (2), *Cionura erecta* (2), *Crepis neglecta* (2), *Micropus erectus* (2), *Carex extensa* (1), *Achillea chrysocoma* (1), *Erodium cicutarium* (1), *Clypeola jonthlaspi* ssp. *jonthlaspi* (1), *Haplophyllum coronatum* (1), *Lathyrus saxatilis* (1), *Silene graeca* (1), *Cynosurus echinatus* (1), *Nigella arvensis* ssp. *arvensis* (1), *Lomelosia brachiata* (1), *Myosotis incrassata* (1), *Cistus creticus* (1), *Salvia officinalis* (1), *Genista sessilifolia* (1), *Linum nodiflorum* (1).

