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GRASSLAND VEGETATION OF THE ISLAND OF ŠIPAN

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The results of recent investigations of the grassland vegetation on the island of Šipan (Croatia) are presented in this paper. This type of vegetation on the island belongs to the *Thero-Brachypodietea* class, *Thero-Brachypodietalia* order, *Cymbopogo-Brachypodium ramosi* alliance (*Oryzopsidetum miliaceae*, *Brachypodio-Cymbopogonetum hirti* ass.) and *Vulpio-Lotion* alliance (*Ornithopodo-Vulpietum*, *Gastriodio-Brachypodietum ramosi*, *Trifolio-Brachypodietum rupestris* ass.). The communities of the *Vulpio-Lotion* alliance prevail on the island. The floristic composition of the communities investigated is shown in phytocenological tables. The distribution of the communities is presented on the vegetation map.

Introduction

The grassland vegetation of the island of Šipan has not been systematically investigated up to now. The only facts were published by Hodak-Horvatić (1975), wherein the author, describing the new association *Trifolio-Brachypodietum rupestris*, mentioned the island as one of its localities.

Recent investigations of the plant cover of the island (M. Hećimović 1981, 1982) including the grassland vegetation as well, were carried out in 1978 and 1979. The investigations followed the principles and methods of the Zürich-Montpellier school (Braun-Blanquet 1964). The nomenclature of the plant taxa is according to Ehrendorfer (1973), and the nomenclature of the plant communities according to Horvatić (1973).

Results

The grassland vegetation of the island of Šipan is represented by the communities:

Class: *Thero-Brachypodietea* Br.-Bl. 1942

Order: *Thero-Brachypodietalia* Br.-Bl. (1931) 1936

Alliance: *Cymbopogo-Brachypodion ramosi* H-ić (1956) 1958

Ass.: *Oryzopsidetum miliaceae* H-ić (1956) 1958

Ass.: *Brachypodio-Cymbopogonetum hirti* H-ić 1961

Alliance: *Vulpio-Lotion* H-ić 1960

Ass.: *Ornithopodo-Vulpietum* H-ić 1960

Ass.: *Gastridio-Brachypodietum ramosi* H-ić 1962

Ass.: *Trifolio-Brachypodietum rupestris* Hodak 1975

Ass. *ORYZOPSIDETUM MILIACEAE* H-ić (1956) 1958

The *Oryzopsidetum miliaceae* association is a slightly nitrophile grassland community of the East-Adriatic coast (Horvatić 1957, 1958, 1963b), where it grows mainly near human settlements.

The community most frequently appears on the island of Šipan, either in villages (Luka Šipanska, Sudurad) or in their vicinity (Fig. 1). It usually grows in parks, neglected olivegroves, along paths and on fringes of allepo pine forests. Such places are often shaded, more or less polluted by different organic refuse and exposed somewhat to the treading of poultry.

The floristic composition of the association (Table 1) is shown on the basis of 7 phytocenological records. The association is characterized by the species *Oryzopsis miliacea*, *Calamintha nepetoides*, *Carex divulsa*, *Verbascum sinuatum* and *Pallenis spinosus*. The species *Oryzopsis miliacea* is completely constant and dominant as it was also found by earlier investigations of the community on the East-Adriatic coast (cp. Horvatić 1963b, 1963c, Birać 1973). Species of other systematic categories are also well represented. As a result of moderate pollution there are also some species of the *Chenopodietea* class in the group of companions (*Rumex pulcher*, *Carduus pycnocephalus*, *Scolymus hispanicus*, *Conyza canadensis*, *Avena sterilis*, *Sonchus asper* subsp. *glaucescens*).

Ass. *BRACHYPODIO-CYMBOPOGONETUM HIRTI* H-ić 1961

The *Brachypodio-Cymbopogonetum hirti* association is mainly known in the middle part of the East-Adriatic coast (the island of Korčula and Hvar), where the community grows on extremely stony, calcareous soil (Horvatić 1962a, 1963a, 1963b, also Horvat et al. 1974).

The community is distributed over the northwestern and southwestern parts of the island of Šipan (Fig. 1). It grows on stony ground of olive-grove terraces which have a southwestern exposure. The grassland is used for haymaking and grazing.

The floristic composition of the association (Table 2) is presented on the basis of 10 records. There is only one characteristic species of the association, *Cymbopogon hirtus* subsp. *hirtus*, which is permanently and abundantly present. The groups of the characteristic species of the

alliance, order and class as well as companions are represented by a great number of species.

Ass. *ORNITHOPODO-VULPIETUM* H-ić 1960

The grassland *Ornithopodo-Vulpietum* is mainly distributed over southern Dalmatian islands (Horvatić 1962b, 1963b, 1963c, 1969, also Horvat et al. 1974, S. Hećimović 1981).

The community occupies very small areas on the island of Šipan. It has been found in two localities only, the southwestern (Bjelanovo) and southeastern (Pakljena) parts of the island (Fig. 1). The grassland develops on deep ground in cultivated areas which have been neglected and is used for haymaking and grazing.

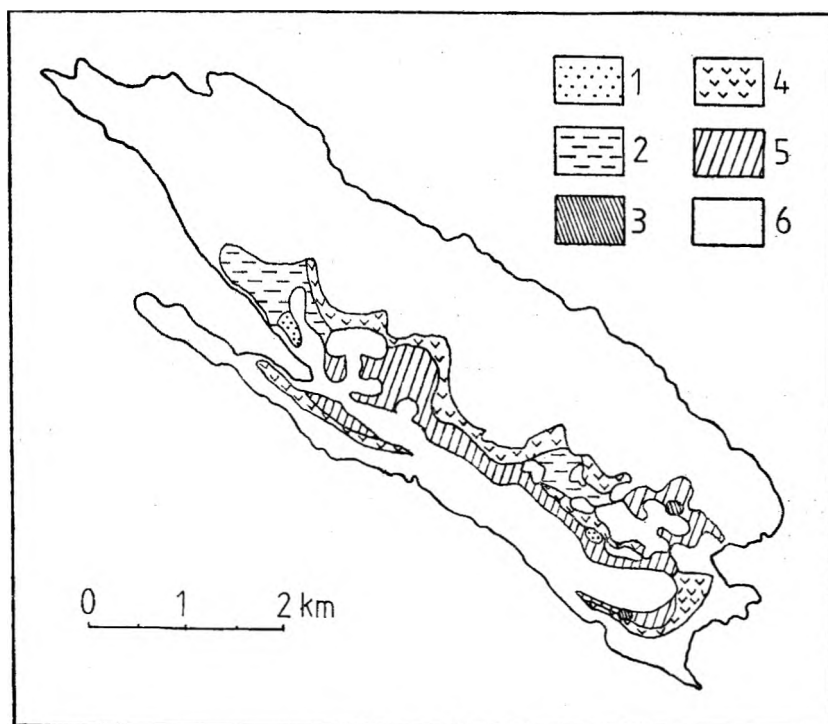


Fig. 1. Distribution of the grassland vegetation on the island of Šipan (1 — *Oryzopsidetum miliaceae*, 2 — *Brachypodio-Cymbopogonetum hirti*, 3 — *Ornithopodo-Vulpietum*, 4 — *Gastridio-Brachypodietum ramosi*, 5 — *Trifolio-Brachypodietum rupestris*, 6 — other types of vegetation)

The floristic composition of the association (Table 3) is shown on the basis of 6 phytocenological records. It is characterized by the species *Ornithopus compressus*, *Vulpia myuros* and *Gaudinia fragilis*. The species *Ornithopus compressus* has the highest presence (V), while the other two species are less represented. *Vulpia ciliata*, a characteristic species of the alliance, is the dominant species in the association.

Ass. *GASTRIDIO-BRACHYPODIETUM RAMOSI* H-ić 1962

The largest part of dry grasslands and stony pastures on extremely stony, decalcified soils, in the southern part of the East-Adriatic coast belongs to the *Gastridio-Brachypodietum ramosi* association (H o r v a t i ć 1963a, 1963b, 1963c, 1964, 1969, 1970, cp. also H o r v a t et al. 1974).

The association is very common on dry and higher positions of the middle crag on the island of Šipan (Fig. 1). It develops in olive-groves, on fringes and glades of forests, macchia and garigue. The grassland is seldom used for haymaking and grazing.

The floristic composition of the association (Table 4) is presented on the basis of 10 records. The association is characterized by the species *Galium divaricatum*, *Phleum echinatum*, *Gastridium ventricosum*, *Trifolium lappaceum*, *Spiranthes spiralis* and *Ophrys cornuta*. The species *Gastridium ventricosum*, which was, according to the earlier investigations of southern Dalmatian islands (H o r v a t i ć 1963b), constantly represented in the association, is not so frequent in the community on the island of Šipan. The companion *Brachypodium retusum* is the dominant species in the association.

Ass. *TRIFOLIO-BRACHYPODIETUM RUPESTRIS* Hodak 1975

The *Trifolio-Brachypodietum rupestris* association is known in the wider surroundings of Dubrovnik (Trsteno — Orašac), including the island of Šipan (H o d a k-H o r v a t i ć 1975).

Recent investigations have shown that the community occupies quite large areas of the island of Šipan. The community is distributed over the Šipan valley and lower parts of the middle crag, as well as in the valley in the southeastern part of the island (Fig. 1), and develops either as a grassy cover in olive-groves or as a meadow in valleys where the ground is deeper and more humid.

The floristic composition of the association (Table 5) is shown on the basis of 7 phytocenological records. There are two characteristic species of the association. The species *Brachypodium rupestre* is dominant in all the records, while the other characteristic species, *Trifolium echinatum*, is rare and scanty. Species of other systematic categories are also well presented.

C o n c l u s i o n

The grassland vegetation of the island of Šipan is represented by the communities *Oryzopsidetum miliaceae*, *Brachypodio-Cymbopogonetum hirti* (*Cymbopogo-Brachypodion ramosi* alliance), *Ornithopodo-Vulprietum*, *Gastridio-Brachypodietum ramosi*, *Trifolio-Brachypodietum rupestris* (*Vulpio-Lotion* alliance).

The largest part covered by grassland vegetation is occupied by the *Gastridio-Brachypodietum ramosi* association, which develops on higher positions, and *Trifolio-Brachypodietum rupestris* in the lower parts of the island. *Brachypodio-Cymbopogonetum hirti* occupies some of the more protected sites on the western slope of the middle crag. As a slightly nitrophile grassland community, the association *Oryzopsidetum miliaceae* is connected with villages and hamlets. The *Ornithopodo-Vulprietum* community is the least represented one. It is to be found in only two small localities.

Table 1. *ORYZOPSISIDETUM MILIACEAE* H-ić (1956) 1958

Life form	No. of species	30	29	29	28	28	28	34	Presence
	Size of stand (m ²)	25	16	16	25	16	25	12	
	Cover (%)	100	100	100	90	80	90	90	
	Altitude (m)	10	10	40	5	5	5	20	
	Exposition	W	W	SW	—	W	NE	—	
	Inclination in grades	20	20	30	—	20	30	—	
	No. of record	1	2	3	4	5	6	7	
Characteristic species of the ass.									
H	<i>Oryzopsis miliacea</i> (L.) Asch. et Schweinf.	4.3	3.2	3.2	4.3	3.2	3.2	3.2	V
H	<i>Calamintha neopetoides</i> Jord.	2.2	3.2	2.2	1.2	1.1	+	+	V
H	<i>Carex divulsa</i> Stokes	1.2	2.2	2.2	+	.	+.	.	IV
H	<i>Verbascum sinuatum</i> L.	+	1.1	.	+	.	1.1	+	IV
T	<i>Palleis spinosus</i> (L.) Cass.	+	1.1	.	+	.	+	1.1	IV
<i>Cymbopogo-Brachypodium ramosi</i>									
H	<i>Cymbopogon hirtus</i> (L.) Janch. subsp. <i>hirtus</i>	+.	.	+.	1.2	+.	.	1.2	IV
T	<i>Picris hieracioides</i> L.	.	.	+	+	.	+	.	III
G	<i>Convolvulus altheoides</i> L. subsp. <i>tenuissimus</i> (Sibth. et Sm.) Stace	+	.	+	.	+	.	.	III
T	<i>Crucianella latifolia</i> L.	.	.	.	+	.	.	+	II
H	<i>Centaurea glaberrima</i> Tausch.	.	.	.	.	.	.	+	I
<i>Thero-Brachypodieta</i>									
H	<i>Brachypodium rupestre</i> (Host) Roem. et Schult.	1.2	1.2	1.2	1.2	.	+.	.	IV
H	<i>Psoralea bituminosa</i> L.	.	1.1	.	+.	.	+	1.2	III
T	<i>Lagurus ovatus</i> L.	+	+	.	+	.	+	.	III
G	<i>Spiranthes spiralis</i> (L.) Chevall.	+	+	.	.	+	+	.	III
T	<i>Briza maxima</i> L.	+	.	+	+	.	+	.	III
T	<i>Trifolium angustifolium</i> L.	.	+	+	+	.	.	.	III
H	<i>Leontodon tuberosus</i> L.	.	.	.	+	+	.	+	III
T	<i>Medicago minima</i> (L.) Bartal.	.	.	.	.	+	.	+	II
<i>Thero-Brachypodietea</i>									
H	<i>Carlina corymbosa</i> L.	1.1	1.1	+	+	1.1	2.1	1.1	V
H	<i>Petrorhagia saxifraga</i> (L.) Lk.	+	.	1.2	.	+	1.2	+.	IV
H	<i>Stipa bromoides</i> (L.) Dörfel.	+	+	1.2	.	.	+.	.	III
T	<i>Bupleurum veronense</i> Turra	+	.	+	.	+	.	1.2	III
T	<i>Cynosurus echinatus</i> L.	+	+	.	.	+	.	+	III
H	<i>Reichardia picroides</i> (L.) Roth	+	.	+	.	+	+	.	III
H	<i>Sanguisorba minor</i> Scop.	+	.	.	+	+	.	+	III
T	<i>Catapodium rigidum</i> (L.) C. E. Hubb.	.	.	.	+.	.	1.2	+.	III
Ch	<i>Teucrium polium</i> L.	.	+	.	+	.	.	+	III
T	<i>Prunella laciniata</i> (L.) L.	.	+	.	+	.	.	+	III
Ch	<i>Helichrysum italicum</i> (Roth) Guss.	.	.	+.	.	+.	.	.	II
Ch	<i>Thymus longicaulis</i> K. Presl. f. <i>freyii</i> Ronn.	.	.	+.	.	.	+.	.	II
Companions									
H	<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	+	+	1.2	+	+	+	+	V
H	<i>Plantago lanceolata</i> L.	+	+	+	.	+	.	+	IV
H	<i>Inula viscosa</i> (L.) Aiton	+	.	+	+	+	.	.	III
H	<i>Origanum heracleoticum</i> L.	+	.	+	.	.	+	.	III
H	<i>Hypericum perforatum</i> L.	+	.	+	.	.	.	+	III
T	<i>Bromus madritensis</i> L.	+	.	.	+	.	.	+	III
P	<i>Asparagus acutifolius</i> L.	+	.	.	.	.	+	+	III
H	<i>Daucus carota</i> L. subsp. <i>maximus</i> (Desf.) Ball	.	+	+	+	.	.	.	III
H	<i>Rumex pulcher</i> L.	.	+	.	.	+	+	.	III
H	<i>Campanula rapunculus</i> L.	.	.	.	+	+	+	.	III
T	<i>Medicago lupulina</i> L.	.	.	.	+	+	.	+	III
H	<i>Brachypodium retusum</i> (Pers.) PB.	.	+.	.	.	1.2	.	.	II
G	<i>Allium dalmaticum</i> Kern.	+	+	.	.	.	.	.	II
T	<i>Anthoxanthum puelii</i> Lecoq et Lamotte	+	.	+	.	.	.	.	II
H	<i>Melica transsilvanica</i> Schur	+	.	.	+	.	.	.	II
H	<i>Euphorbia pinea</i> L.	.	+	+	.	.	.	.	II
H	<i>Leontodon crispus</i> Vill.	.	+	.	.	+	.	.	II
T	<i>Nigella damascena</i> L.	.	+	.	.	.	+	.	II
P	<i>Rubus ulmifolius</i> Schott. subsp. <i>dalmatinus</i> (Tratt.) Focke	.	.	+	.	+	.	.	II
T	<i>Coronilla cretica</i> L.	.	.	+	.	.	+	.	II
T	<i>Carduus pycnocephalus</i> L.	.	.	+	.	.	+	+	II
H	<i>Chondrilla juncea</i> L.	.	.	+	.	.	.	+	II
Ch	<i>Silene vulgaris</i> (Moench) Garcke subsp. <i>vulgaris</i>	.	.	+	.	.	.	+	II
H	<i>Scolymus hispanicus</i> L.	.	.	.	+	.	.	+	II
T	<i>Coryza canadensis</i> (L.) Cronq.	.	.	.	.	+	+	.	II
H	<i>Cichorium intybus</i> L.	.	.	.	.	+	.	+	II
H	<i>Daucus carota</i> L.	.	.	.	.	.	+	+	II

The following species occur in one record only: 1 — *Avena barbata* Pott ex Lk. +, *Foeniculum vulgare* Mill. +.2; 2 — *Teucrium chamaedrys* L. +, *Blackstonia perfoliata* (L.) Huds. +, *Allium coppoleri* Tin. +, *Ruta chalepensis* L. +, *Arabis hirsuta* (L.) Scop. +; 4 — *Avena sterilis* L. +; 5 — *Cynodon dactylon* (L.) Pers. +, *Fallopia convolvulus* (L.) A. Löve 1.2, *Taraxacum officinale* Web. +; 6 — *Sonchus asper* (L.) Hill. subsp. *glaucescens* (Jord.) J. Ball +; 7 — *Trifolium campestre* Schreb. +, *Hedera helix* L. +, *Clematis flammula* L. +, *Parietaria judica* L. +, *Rubia peregrina* L. +.

Localities of the records: 1, 2 — Luka Šipanska, northeastern part of the village, olive-grove (24. 6. 1979); 3 — Veli Vrh, west of the hamlet, olive-grove (24. 6. 1979); 4, 5 — Luka Šipanska, northern part of the village (24. 6. 1979); 6 — Sudurad, western part of the village (7. 7. 1979); 7 — Đardin, orchard (7. 7. 1979).

Table 3. ORNITHOPODO-VULPIETUM H-ić 1960

Life form	No. of species	40	33	36	36	30	42	Presence
	Size of stand (m ²)	25	9	12	25	25	25	
	Cover (%)	100	100	100	100	100	100	
	Altitude (m)	20	20	20	30	30	30	
	Exposition	SE	SE	SE	—	—	—	
	Inclination in grades	20	20	20	—	—	—	
	No. of record	1	2	3	4	5	6	
	Characteristic species of the ass.							
T	<i>Ornithopus compressus</i> L.	1.2	2.2	1.2	1.2	2.2	1.2	V
T	<i>Vulpia myuros</i> (L.) C. C. Gmel.	3.2	+2	.	+2	1.2	.	IV
T	<i>Gaudinia fragilis</i> (L.) PB.	.	.	+	.	+	+	III
	<i>Vulpio-Lotion</i>							
T	<i>Vulpia ciliata</i> Dumort	1.2	3.2	3.2	3.4	3.2	3.2	V
T	<i>Trifolium nigerescens</i> Viv. subsp. <i>polyanthemum</i> (Ten.) A. u G.	1.2	1.2	2.2	+2	.	1.2	V
T	<i>Aira elegans</i> Willd. ex Gaudin	1.2	+	+	1.2	+	.	V
T	<i>Lotus angustissimus</i> L.	1.2	+	1.2	.	.	+	IV
T	<i>Trifolium stellatum</i> L.	+	1.1	1.1	+	.	.	IV
T	<i>Lagurus ovatus</i> L.	.	1.1	+	.	.	+	III
T	<i>Trifolium subterraneum</i> L.	.	1.2	.	.	.	+2	II
T	<i>Trifolium cherleri</i> L.	.	+	+	.	.	.	II
	<i>Thero-Brachypodieta</i>							
T	<i>Medicago minima</i> (L.) Bartal.	2.2	1.2	+	+	.	1.2	V
T	<i>Briza maxima</i> L.	+	+	1.1	+	.	1.1	V
T	<i>Hymenocarpus circinatus</i> (L.) Savi	+	+	.	+	1.1	+	V
T	<i>Lotus edulis</i> L.	1.1	.	+	+	1.1	.	IV
T	<i>Trifolium angustifolium</i> L.	+	+	+	.	.	+	IV
T	<i>Medicago orbicularis</i> (L.) Bartal.	+	.	.	+	+	+	IV
T	<i>Trifolium scabrum</i> L.	+	.	.	1.2	1.2	.	III
T	<i>Lotus ornithopodioides</i> L.	+	.	1.2	.	.	+	III
H	<i>Carex divulsa</i> Stokes	.	.	.	+2	+2	+2	III
T	<i>Scorpiurus muricatus</i> L.	.	+	+	.	.	+	III
G	<i>Allium subhirstum</i> L.	.	+	.	+	+	.	III
T	<i>Petrorhagia glumacea</i> (Chaub. et Bory) Ball et Heyw.	+	.	+	.	.	.	II
T	<i>Valantia muralis</i> L.	+	.	.	+	.	.	II
H	<i>Cymbopogon hirtus</i> (L.) Janch. subsp. <i>hirtus</i>	+	.	.	.	.	+	II
T	<i>Trifolium dalmaticum</i> Vis.	.	+	.	+	.	+	II
H	<i>Leontodon tuberosus</i> L.	.	.	.	+	.	+	II
T	<i>Medicago litoralis</i> Rhode ex Loisel.	.	+	.	.	.	.	I
	<i>Thero-Brachypodietea</i>							
T	<i>Poa bulbosa</i> L. var. <i>vivipara</i> Koekl.	1.2	+2	+	.	+	.	IV
H	<i>Petrorhagia saxifraga</i> (L.) Lk.	+	+	+	.	.	+	IV
	<i>Sanguisorba minor</i> Scop.	+	.	+	+	.	+	IV
Ch	<i>Thymus longicaulis</i> K. Presl. f. <i>freyii</i> Ronn.	+	.	.	1.2	1.2	.	III
T	<i>Cynosurus echinatus</i> L.	.	.	.	+	.	1.2	II
H	<i>Koeleria splendens</i> K. Presl.	.	.	+2	.	+2	.	II
Ch	<i>Teucrium polium</i> L.	+	.	+2	.	.	.	II
H	<i>Anthyllis vulneraria</i> L. subsp. <i>praepropera</i> (Kern.) Bornm.	.	+	+	.	.	.	II
T	<i>Catapodium rigidum</i> (L.) C. E. Hubb.	.	.	.	+	+	.	II
T	<i>Brachypodium distachyon</i> (L.) PB.	.	.	.	+	+	.	II
G	<i>Carex flacca</i> Schreb. subsp. <i>serrulata</i> (Biv.) Greut.	+	.	.	.	.	.	I
T	<i>Linum trigynum</i> L.	.	.	.	.	.	+	I
	Companions							
H	<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	+	+	+	+	+	.	V
H	<i>Campanula rapunculus</i> L.	+	+	+	+	.	+	V
H	<i>Leontodon crispus</i> Vill.	+	+	1.1	.	.	1.1	IV
H	<i>Trifolium campestre</i> Schreb.	.	+	1.1	.	.	1.2	III
H	<i>Poa sylvicola</i> Guss.	.	.	.	+	+2	+2	II
H	<i>Inula viscosa</i> (L.) Aiton	+	+	+	.	.	.	III
H	<i>Plantago lanceolata</i> L.	+	+	+	.	.	.	III
T	<i>Geranium molle</i> L.	+	+	+	.	.	.	III
T	<i>Herniaria glabra</i> L.	+	+	.	.	.	+	III
T	<i>Vicia sativa</i> L.	+	+	.	.	.	+	III
T	<i>Bromus madritensis</i> L.	+	.	.	+	+	.	III
T	<i>Cerastium glomeratum</i> Thiull.	+	.	.	+	+	.	III
T	<i>Aegilops geniculata</i> Roth	+	.	.	+	.	+	III
T	<i>Vicia hybrida</i> L.	.	.	+	+	.	+	III
Ch	<i>Trifolium repens</i> L.	.	.	+	.	+	+	III
Ch	<i>Teucrium chamaedrys</i> L.	.	+	1.2	.	.	.	II
T	<i>Lolium rigidum</i> Gaudin	.	.	+	.	1.2	.	II
Ch	<i>Aethionema saxatile</i> (L.) R. Br.	+	.	.	.	.	+	II
T	<i>Lathyrus aphaca</i> L.	+	.	.	.	.	+	II
T	<i>Sonchus asper</i> (L.) Hill. subsp. <i>glaucescens</i> (Jord.) J. Ball	+	.	.	+	.	.	II
T	<i>Tordylium apulum</i> L.	.	+	.	.	.	+	II
T	<i>Geranium rotundifolium</i> L.	.	.	+	.	+	.	II
T	<i>Medicago arabica</i> (L.) Huds.	.	.	+	+	.	.	II
H	<i>Ranunculus neapolitanus</i> Ten.	.	.	.	+	+	.	II
T	<i>Sherardia arvensis</i> L.	.	.	.	+	.	+	II
T	<i>Lophochloa cristata</i> (L.) Hyl.	.	.	.	+	.	+	II

The following species occur in one record only: 1 — *Avena barbata* Pott ex Lk. +, *Euphorbia peplus* L. +; 2 — *Luzula campestris* (L.) DC. +; 3 — *Coronilla cretica* L. +; 4 — *Bromus hordeaceus* L. +, *Stachys cretica* L. subsp. *slavifolia* (Ten.) Rech. f. +; 5 — *Securigera securidaca* (L.) Degen et Dörf. +, *Galium lucidum* All. +, *Silene vulgaris* (Moench) Garcke subsp. *vulgaris* +, *Hieracium bauhinii* Schult. +, *Crepis setosa* Hall. f. +, *Ranunculus arvensis* L. +; 6 — *Bromus sterilis* L. +, *Rubus ulmifolius* Schott. subsp. *dalmatinus* (Tratt.) Focke +, *Convoldulus arvensis* L. +, *Rhagadiolus stellatus* (L.) Gaertn. +, *Medicago sativa* L. +, *Sedum acre* L. +, *Oenanthe pimpinelloides* L. +.

Localities of the records: 1, 2, 3 — Bjelanovo (20. 5. 1979); 4, 5, 6 — Sudurad, Pakljena (1. 6. 1979).

Table 4. *GASTRIDIO-BRACHYPODIETUM RAMOSI* H-ić 1962

Life form	No. of species										Presence	
	48	30	34	45	30	34	41	42	32	34		
	25	25	25	25	25	20	30	30	25	25		
	100	100	100	100	100	100	100	100	100	100		
	10	90	100	100	100	20	80	80	80	80		
	—	—	—	SW	—	W	W	—	—	—		
	—	—	—	20	—	30	20	—	—	—		
	1	2	3	4	5	6	7	8	9	10		
Characteristic species of the ass.												
T	<i>Galium divaricatum</i> Lam.	1.2	.	+	+	.	+	.	1.2	+2	1.2	IV
T	<i>Phleum echinatum</i> Host	+	.	+	+	.	+	.	1.1	.	+	IV
T	<i>Gastridium ventricosum</i> (Gouan) Schinz et Thell.	.	.	.	.	.	.	.	1.2	+2.	+	III
T	<i>Trifolium lappaceum</i> L.	.	+	.	.	.	.	.	.	.	.	II
G	<i>Spiranthes spiralis</i> (L.) Chevall.	.	.	.	.	.	.	.	.	+	+	II
G	<i>Ophrys cornuta</i> Stev.	.	+	+	.	.	.	.	.	.	.	II
<i>Vulpio-Lotion</i>												
T	<i>Lagurus ovatus</i> L.	+	+	.	+	1.2	.	+2	+	.	.	IV
T	<i>Trifolium stellatum</i> L.	+	.	+	+	.	.	+	+	+	.	IV
T	<i>Aira elegans</i> Willd. ex. Gaudin	+2	.	+2	+2	.	.	.	+2	.	.	III
T	<i>Vulpia ciliata</i> Dumort	+2	.	.	+2	.	.	.	+2	.	.	III
T	<i>Lotus angustissimus</i> L.	+	.	+2	.	.	+	.	.	.	.	II
T	<i>Trifolium nigrescens</i> Viv. subsp. <i>polyanthemum</i> (Ten.) A. u G.	.	.	.	.	.	.	.	+2	.	1.2	II
H	<i>Brachypodium rupestre</i> (Host) Roem. et Schult.	.	+2	.	.	.	.	.	+2	+2	.	II
<i>Thero-Brachypodieta</i>												
H	<i>Psoralea bituminosa</i> L.	1.2	2.2	+	1.2	3.2	+	+	1.1	1.2	2.2	V
T	<i>Briza maxima</i> L.	+	+	+	+	1.1	.	+	+	+	.	V
G	<i>Convolvulus althaeoides</i> L. subsp. <i>tenuissimus</i> (Sibth. et Sm.) Stace	+	+	+	+	.	+	+	.	+	+	V
T	<i>Pallenis spinosus</i> (L.) Cass.	+	1.1	+	1.1	.	+	.	1.1	+	.	IV
T	<i>Medicago minima</i> (L.) Bartal.	.	+2	1.2	.	+2	+2	.	+	+	+	IV
H	<i>Calamintha nepetoides</i> Jord.	.	+	.	+	+2	.	.	+	1.2	1.2	IV
H	<i>Leontodon tuberosus</i> L.	.	.	+	+	.	+	+	+	.	+	IV
T	<i>Lotus edulis</i> L.	.	+	.	1.2	.	+	+	.	.	1.2	III
G	<i>Allium subhirsutum</i> L.	+	.	+	+	1.1	.	.	.	+	.	III
T	<i>Linum strictum</i> L.	.	+	+	+	.	.	+	+	.	.	III
T	<i>Trifolium angustifolium</i> L.	+	.	+	1.2	.	.	.	1.2	.	.	III
H	<i>Carex divulsa</i> Stokes	+2	.	.	+2	.	+2	.	.	.	.	II
H	<i>Centaurea glaberrima</i> Tausch	+	+	.	.	+	.	.	.	.	.	II
T	<i>Picris hieracioides</i> L.	.	.	.	.	.	+	+	.	+	.	II
H	<i>Cymbopogon hirtus</i> (L.) Janch. subsp. <i>hirtus</i>	.	+2	.	.	+2	.	.	.	.	.	II
H	<i>Oryzopsis miliacea</i> (L.) Asch. et Schweinf.	.	.	.	.	.	.	.	+2	.	+2	II
T	<i>Petrorhagia glumacea</i> (Chaub. et Bory) Ball et Heyw.	.	+	.	+	.	.	.	.	.	.	II
T	<i>Medicago litoralis</i> Rhode ex Loisel.	.	.	.	.	.	+	.	+	.	.	II
<i>Thero-Brachypodieta</i>												
Ch	<i>Thymus longicaulis</i> K. Presl. f. <i>freynei</i> Ronn.	1.2	1.2	+2	2.2	1.2	1.2	+2	1.2	2.2	1.2	V
H	<i>Carlina corymbosa</i> L.	+	1.1	1.1	+	1.1	+	.	+	+	1.1	V
H	<i>Petrorhagia saxifraga</i> (L.) Lk.	1.2	.	+	+	+	+	+	1.2	.	.	IV
H	<i>Koeleria splendens</i> K. Presl	+2	1.2	+2	.	1.2	.	+2	.	1.2	.	IV
Ch	<i>Teucrium polium</i> L.	+2	.	1.2	+	.	.	1.2	+	+2	.	IV
T	<i>Bupleurum veronense</i> Turra	.	.	.	+	.	1.2	+	+	+	+	IV
H	<i>Sanguisorba minor</i> Scop.	+	.	.	1.1	+	.	+	+	+	.	III
H	<i>Reichardia picroides</i> (L.) Roth	+	.	.	+	+	.	.	+	.	+	III
H	<i>Asperula aristata</i> L. f. subsp. <i>longiflora</i> (W. et K.) Hyek	+	.	.	+	.	+	.	+	+	.	III
T	<i>Catapodium rigidum</i> (L.) C. E. Hubb.	.	.	+2	.	1.2	.	+	+	.	.	III
Ch	<i>Helichrysum italicum</i> (Roth) Guss.	.	.	.	+	.	+	1.2	.	.	+2	III
H	<i>Cleistanthus serotina</i> (L.) Keng	.	.	.	.	.	.	2.2	1.2	+	.	II
H	<i>Anthyllus vulneraria</i> L. subsp. <i>praepropera</i> (Kern.) Bornm.	1.2	.	.	.	.	.	+2	.	.	+	II
T	<i>Cynosurus echinatus</i> L.	.	.	.	+	.	.	+	.	.	+	II
G	<i>Carex flacca</i> Schreb. subsp. <i>serrulata</i> (Biv.) Greut.	+	.	.	.	+	.	.	.	.	.	II
H	<i>Eryngium amethystinum</i> L.	+	.	.	.	+	.	.	.	.	.	II
T	<i>Linum tenuifolium</i> L.	.	.	.	.	+	+	.	.	.	.	II
Companions												
H	<i>Brachypodium retusum</i> (Pers.) PB.	4.3	3.3	4.3	3.3	3.2	5.2	4.3	3.3	3.2	3.2	V
T	<i>Centaureum erythraea</i> Rafn	+	+	+	+	+	+	+	+	+	+	V
T	<i>Medicago lupulina</i> L.	+	+	+	+	+	.	+	+	1.2	+2	V
H	<i>Daucus carota</i> L.	+	+	+	+	+	+	+	+	+	+	V
Ch	<i>Aathionema saxatile</i> L.(.) R. Br.	+	+	+	+	+	+	+	+	+	+	V
H	<i>Leontodon crispus</i> Vill.	+	+	.	+	1.1	.	+	.	+	+	IV
Ch	<i>Silene vulgaris</i> (Moench) Garcke subsp. <i>vulgaris</i>	+	.	+	+	+	.	.	1.1	+	+	IV
H	<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	+	+	+	.	.	+	+	+	.	+	IV
H	<i>Campanula rapunculoides</i> L.	+	+	+	.	.	+	.	+	+	+	IV
P	<i>Asparagus acutifolius</i> L.	+	.	+	+	.	.	.	.	1.2	+	IV
Ch	<i>Sedum ochroleucum</i> Chaix	+	+	+	.	.	.	+	.	+	+	IV
H	<i>Rubia peregrina</i> L.	+	.	+	+	+	.	+	+	.	.	IV
H	<i>Inula viscosa</i> (L.) Aiton	+	.	+	+	+	+	+	.	.	+	IV
H	<i>Trifolium campestre</i> Schreb.	+	.	.	+	+	.	+	.	.	+	III
Ch	<i>Micromeria graeca</i> (L.) Benth. ex Rchb.	+2	.	.	+2	+2	+2	.	.	.	.	III
H	<i>Arabis hirsuta</i> (L.) Scop.	+	.	+	+	.	.	.	.	.	+	III
H	<i>Plantago lanceolata</i> L.	+	.	+	.	.	.	+	+	.	.	III
H	<i>Hieracium bauhinii</i> Schult.	+	.	.	.	.	+	+	.	.	+	III
T	<i>Bromus madritensis</i> L.	.	+	.	+	.	+	.	.	.	+	III
H	<i>Poa sylvicola</i> Guss.	.	.	.	.	.	.	.	+2	.	+	II
T	<i>Campanula lingulata</i> Waldst. et Kit.	+	.	+	.	.	+	.	.	.	.	II
H	<i>Stachys creatica</i> L. subsp. <i>salvifolia</i> (Ten.) Rech. f.	.	+	.	+	.	.	+	.	.	.	II
H	<i>Euphorbia pinea</i> L.	.	+	.	.	.	+	.	.	.	.	II
P	<i>Rubus ulmifolius</i> Schott. subsp. <i>dalmatinus</i> (Tratt.) Focke	.	.	.	+	.	+	.	.	.	.	II
H	<i>Hypericum perforatum</i> L.	.	.	.	.	+	+	.	+	.	.	II
H	<i>Hieracium heterogynum</i> (Froel.) Guterm.	.	.	.	.	.	+	.	.	+	.	II

The following species occur in one record only: 1 — *Calicotome villosa* (Poir.) Link +, *Avena sterilis* L. +, *Coronilla cretica* L. +; 7 — *Clematis flammula* L. +; 8 — *Aegilops geniculata* Roth +; 9 — *Erica manipuliflora* Salisb. +2

Localities of the records: 1 — Sudurad, north of the village, (31. 5. 1979); 2 — Fraiga, north of the hamlet, olive-grove (1. 6. 1979); 3 — Tor, southeastern part, olive-grove (1. 6. 1979); — 4 Sv. Ilija hill, northern part (10. 6. 1979); 5 — Goravice olive-grove (10. 6. 1979); 6 — Sudurad, northeast of the village, olive-grove (10. 6. 1979); 7, 8 — Veli Vrh, southeast of the hamlet (24. 6. 1979); 9, 10 — Pobrde, olive-grove (24. 6. 1979).

Table 5. TRIFOLIO-BRACHYPODIETUM RUPESTRIS Hodak 1975

Life form	No. of species	33	38	29	32	28	33	29	Presence
	Size of stand (m ²)	25	25	20	25	30	25	20	
	Cover (%)	100	100	100	100	100	100	100	
	Altitude (m)	20	20	20	80	30	30	20	
	Exposition	—	—	—	—	—	SE	—	
	Inclination in grades	—	—	—	—	—	20	—	
	No. of record	1	2	3	4	5	6	7	
Characteristic species of the ass.									
H	<i>Brachypodium rupestre</i> (Host) Roem. et Schult.	4.3	3.2	3.2	4.3	4.3	4.3	4.3	V
T	<i>Trifolium echinatum</i> Bieb.	.	+	1.2	.	.	+	.	III
<i>Vulpio-Lotion</i>									
T	<i>Trifolium stellatum</i> L.	+	+	1.2	.	+	1.2	.	IV
T	<i>Trifolium nigrescens</i> Viv. subsp. <i>polyanthemum</i> (Ten.) A. u G.	.	1.2	.	1.1	.	.	+	III
T	<i>Aira elegans</i> Willd. ex Gaudin	.	.	+2	.	.	1.2	+	III
T	<i>Vulpia myuros</i> (L.) C. C. Gmel.	.	.	+2	.	.	+2	.	II
T	<i>Phleum echinatum</i> Host	+	.	.	.	+	.	.	II
T	<i>Trifolium cherleri</i> L.	.	+	.	.	+	.	.	II
T	<i>Ornithopus compressus</i> L.	.	.	.	.	.	.	+	I
<i>Thero-Brachypodietalia</i>									
H	<i>Carex divulsa</i> Stokes	+2	1.2	2.2	.	.	1.2	1.2	IV
H	<i>Psoralea bituminosa</i> L.	1.1	.	+	+	.	.	1.2	III
T	<i>Medicago orbicularis</i> (L.) Bartal.	+	+	+	.	+	+	+	III
T	<i>Medicago minima</i> (L.) Bartal.	+	+	.	.	+	.	+	III
H	<i>Leontodon tuberosus</i> L.	+	+	.	.	+	.	.	III
G	<i>Convolvulus althaeoides</i> L. subsp. <i>tenuissimus</i> (Sibth. et Sm.) Stace	+	+	.	.	.	.	+	III
T	<i>Briza maxima</i> L.	.	.	.	+	.	+	+	III
H	<i>Calamintha nepetoides</i> Jord.	+	.	.	+	.	.	.	II
T	<i>Trifolium angustifolium</i> L.	+	.	.	.	+	.	.	II
H	<i>Crupina ctupinastrum</i> (Moris.) Vis.	.	+	+	.	.	.	.	II
T	<i>Pallenis spinosus</i> (L.) Cass.	.	.	.	+	.	+	.	II
G	<i>Allium subhirsutum</i> L.	.	.	.	.	.	+	+	II
H	<i>Oryzopsis miliacea</i> (L.) Sch. et Schweinf.	.	.	+2	.	.	.	.	I
T	<i>Scorpiurus muricatus</i> L.	.	.	.	.	.	+	.	I
T	<i>Linum strictum</i> L.	.	.	.	.	.	+	.	I
H	<i>Seseli tomentosum</i> Vis.	.	.	.	.	.	.	+	I
<i>Thero-Brachypodietea</i>									
H	<i>Sanguisorba minor</i> Scop.	+	.	+	1.1	+	.	+	IV
Ch	<i>Thymus longicaulis</i> K. Presl. f. <i>freynii</i> Ronn.	.	1.2	.	+2	1.2	.	.	III
H	<i>Koeleria splendens</i> K. Presl	.	+2	.	.	+2	.	+2	III
H	<i>Carlina corymbosa</i> L.	+	.	.	+	+	.	.	III
H	<i>Petrorhagia saxifraga</i> (L.) Lk.	+	.	.	+	+	.	.	III
H	<i>Salvia bertolonii</i> Vis.	.	+	+	.	.	.	.	II
G	<i>Carex flacca</i> Schreb. subsp. <i>serrulata</i> (Biv.) Greut.	.	+	.	.	+	.	.	II
H	<i>Reichardia picroides</i> (L.) Roth	.	.	+	+	.	.	.	II
H	<i>Stipa bromoides</i> (L.) Dörf.	.	+2	.	.	.	.	.	I
H	<i>Eryngium amethystinum</i> L.	.	.	.	.	+	.	.	I
Ch	<i>Helichrysum italicum</i> (Roth) Guss.	.	.	.	.	.	+	.	I
H	<i>Asperula aristata</i> L. f. subsp. <i>longiflora</i> (W. et K.) Hayek	.	.	.	.	.	.	+	I
Companions									
H	<i>Plantago lanceolata</i> L.	1.2	2.2	3.2	+	1.1	1.1	2.2	V
H	<i>Poa sylvicola</i> Guss.	+2	1.2	1.2	1.2	+2	.	1.2	V
H	<i>Trifolium campestre</i> Schreb.	.	+	1.2	+2	+	+	+	V
H	<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	.	+2	+2	+2	+2	+2	+	V
H	<i>Campanula rapunculus</i> L.	1.1	1.1	.	+	+	.	+	IV
H	<i>Leontodon crispus</i> Vill.	+	+	.	+	+	.	+	IV
Ch	<i>Silene vulgaris</i> (Moench) Gracke subsp. <i>vulgaris</i>	+	.	.	1.1	+	.	+	III
T	<i>Prunella laciniata</i> (L.) L.	.	+	.	+	1.1	+	.	III
T	<i>Medicago lupulina</i> L.	.	.	+	.	+	1.2	+	III
T	<i>Centaurium erythraea</i> Rafn	+	+	.	+	.	+	.	III
H	<i>Inula viscosa</i> (L.) Aiton	+	+	.	+	.	+	+	III
T	<i>Geranium columbinum</i> L.	+	.	.	+	.	+	+	III
T	<i>Securigera securidaca</i> (L.) Degen et Dörf.	+	.	.	+	.	+	+	III
T	<i>Bromus madritensis</i> L.	.	+	+	+	.	+	.	III
H	<i>Rumex pulcher</i> L.	.	+	+	.	+	+	.	III
H	<i>Ranunculus neapolitanus</i> Ten.	.	+	.	.	.	1.1	+	III
H	<i>Oenanthe pimpinelloides</i> L.	.	+	+	.	.	+	.	III
H	<i>Lathyrus limifolius</i> (Reichard) Bässl.	.	+	.	+	.	+	.	III
P	<i>Rubus ulmifolius</i> Schott. subsp. <i>dalmatinus</i> (Tratt.) Focke	.	.	.	.	+	+	+	III
T	<i>Nigella damascena</i> L.	1.1	.	.	+	.	.	.	II
T	<i>Trigonella corniculata</i> (L.) L.	.	.	+	.	.	.	.	II
T	<i>Blackstonia perfoliata</i> (L.) Huds.	+	.	.	+	.	.	.	II
T	<i>Carduus pycnocephalus</i> L.	+	.	.	+	.	.	.	II
T	<i>Avena barbata</i> Pott ex Lk.	+	.	.	.	+	.	.	II
H	<i>Foeniculum vulgare</i> Mill.	.	+	+	.	.	.	.	II
H	<i>Hypericum perforatum</i> L.	.	+	.	.	.	+	.	II
H	<i>Hieracium bauhinii</i> Schult.	.	.	+	+	.	.	.	II
H	<i>Daucus carota</i> L.	.	.	+	.	.	+	.	II
H	<i>Hieracium heterogynum</i> (Froel.) Guterm.	.	.	.	+	.	+	.	II
G	<i>Tamus communis</i> L.	.	.	.	.	.	+	+	II

The following species occur in one record only: 1 — *Tordylium apulum* L. +, *Vicia sativa* L. +, *Convolvulus arvensis* L. +, *Galium aparine* L. +, *Anagallis arvensis* L. +; 2 — *Myosotis ramosissima* Roch. ex Schult. +, *Veronica arvensis* L. +, *Trifolium pratense* L. +, *Arabis verna* (L.) R. Br. +, *Coronilla cretica* L. +, *Potentilla hirta* L. +; 3 — *Vicia hybrida* L. +, *Euphorbia pinea* L. +, *Lolium rigidum* Gaudin +2, *Bellis sylvestris* Cyr. +; 4 — *Aethionema saxatile* (L.) R. Br. +, *Inula conyza* DC. +; — 5. *Smilax aspera* L. +, *Erica manipuliflora* Salisb. +; 6 — *Clematis flammula* L. +, *Gladiolus illyricus* Koch +; 7 — *Bromus sterilis* L. +.

Localities of the records: 1, 2 — Mjekov Tor (31. 5. 1979); 3 — Dardin, western part (31. 5. 1979); 4 — Pobrđe, olive-grove (1. 6. 1979); 5 — Vojnovo Selo, west of the hamlet (9. 6. 1970); 6 — Sudurad, Pakljena (9. 6. 1979); 7 — Dubrava, southwestern part (10. 6. 1979).

According to the number of the communities and the area which they occupy, it can be concluded that the vegetation of the *Vulpio-Lotion* alliance prevails on the island of Šipan, while the alliance *Cymbopogo-Brachypodium ramosi* is less represented. These facts are in accordance with Horvatić's (1963a) observations on the significance of those alliances in some parts of the East-Adriatic coast.

*

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SAŽETAK

TRAVNJAČKA VEGETACIJA OTOKA ŠIPANA

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Travnjačka vegetacija otoka Šipana pripada razredu *Thero-Brachypodietea*, redu *Thero-Brachypodietalia* i asocijacijama *Oryzopsidetum miliaceae*, *Brachypodio-Cymbopogonetum hirti* (sveza *Cymbopogo-Brachypodion ramosi*), *Ornithopodo-Vulpietum*, *Gastridio-Brachypodietum ramosi*, *Trifolio-Brachypodietum rupestris* (sveza *Vulpio-Lotion*).

Taj tip vegetacije rasprostranjen je uglavnom na zapadnom i jugozapadnom dijelu središnjeg grebena, u Šipanskom polju i u dolini na jugoistočnom dijelu otoka (sl. 1).

Najveći dio otoka pokrivenog travnjačkom vegetacijom zauzimaju zajednice *Gastridio-Brachypodietum ramosi*, na kamenitim terasama zapuštenih maslinika na višim položajima, i *Trifolio-Brachypodietum rupestris*, na dubljem tlu u udolinama i nižim predjelima otoka. Zajednica *Brachypodio-Cymbopogonetum hirti* zauzima zaštićenije položaje na sjeverozapadnom i jugozapadnom dijelu središnjeg grebena. Kao slabo nitrofilna travnjačka zajednica, asocijacija *Oryzopsidetum miliaceae* veza na je uz sela i zaseoke. Zajednica *Ornithopodo-Vulpietum* najslabije je zastupljena i ograničena na dva mala lokaliteta u jugoistočnom i jugozapadnom dijelu otoka.

Prema broju zajednica i površini koju zauzimaju na otoku Šipanu vidljivo je da prevladava vegetacija sveze *Vulpio-Lotion*. Ta činjenica je u skladu sa Horvatićevim (1963a) zapažanjima o važnosti sveza *Cymbopogo-Brachypodion ramosi* i *Vulpio-Lotion* u pojedinim dijelovima istočnojadranskog primorja.

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