

ACTUAL STATUS OF THE SPREAD OF ASS.  
*OLEO-EUPHORBBIETUM DENDROIDIS* TRINAJSTIĆ 1973  
(OLEO-CERATONION) IN CROATIA

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For the territory of Croatia, the vegetation of alliance Oleo-Ceratonion was discovered first on the small islands of Obljak and Kosor near the island of Korčula, when it was described as ass. *Oleo-Euphorbietum dendroidis*. Shortly afterwards, this association was discovered in the wider area of Dubrovnik and on the Jabuka Island, as well as on the Pelješac Peninsula. During the phytosociological research of the Kornati Islands, a very well-developed ass. *Oleo-Euphorbietum dendroidis* was discovered. The association itself is represented by the subass. *coronilletosum emeroidis*. By the analysis of all so far known relevés of ass. *Oleo-Euphorbietum dendroidis* from the eastern Adriatic Littoral, it can be seen that relevés from Jabuka and Palagruža, due to the absence of differential species of subass. *coronilletosum emeroides*, correspond more to the subass. *typicum*. This allegation is supported also by the numerical analysis of the earlier published and new relevés. The geographical separation of other relevés is clearly noticeable.

Key words: Adriatic Littoral, Ass. *Oleo-Euphorbietum dendroidis*, vegetation

## INTRODUCTION

The evergreen vegetation of the Mediterranean is built mostly of various holm-oak (*Quercus ilex*) forests and macchias which in terms of the syntaxonomy are united in the alliance Quercion ilicis and the order Quercetalia ilicis. In the most xerothermal part of the holm-oak forest range, as the first degradation stage, there are developing the evergreen shrubs or low forests consisting of wild olive (*Olea sylvestris*), pistache (*Pistacia lentiscus*), carob (*Ceratonia siliqua*) and some other species, forming a special vegetational zone, which taxonomically belongs to the alliance Oleo-Ceratonion (cf. Trinajstić 1973).

The vegetation of alliance Oleo-Ceratonion has been studied thoroughly in particular in the western Mediterranean (Braun-Blanquet and Maire 1924, Molinier 1954, Bolos de and Molinier 1958, Bolos de *et al.* 1970), while for the eastern Mediterranean it has been limited geographically only (cf. Oberdorfer 1948). Horvat (1962) and Horvatić (1963a, b) were of opinion that in the Adri-

atic part of the Mediterranean the alliance Oleo-Ceratonion is not typical. Shortly afterwards (cf. Trinajstić 1973), the phytosociological and phytogeographical researches have shown that in the central part of the Dalmatian islands, especially in the border-parts of that archipelago, there are the stands which based on their floral composition should be included in the alliance Oleo-Ceratonion, as well as the associations which by their vegetational and geographical importance and ecological properties belong to the alliance Oleo-Ceratonion.

For the territory of Croatia, the vegetation of alliance Oleo-Ceratonion was discovered first on the small islands of Obljak and Kosor near the southern coast of the island of Korčula in 1971, when it was described as ass. *Oleo-Euphorbietum dendroidis* (Trinajstić 1973). Shortly afterwards, it was found in the wider area of Dubrovnik (Slano, Dubrovnik, Čilipi) and on Jabuka Island (Trinajstić 1984), as well as on the Pelješac Peninsula and in the wider area of Budva in the Montenegrin Littoral (cf. Trinajstić and Pavletić 1990).

During the latest floristical and vegetational researches on the Kornati Islands the ass. *Oleo-Euphorbietum dendroidis* occurs in several locations. The species *Euphorbia dendroides* in the flora of the Kornati Islands has been known for quite a long time (cf. Pevalek 1930, Trinajstić 1986), and for the islands of Mana, Pleščina and Sestrica it has been reported by Gaži-Baskova (1983). On the southwest side of Mana Island, the dense stands of species *Euphorbia dendroides* are noted by Gaži-Baskova and Bedalov (1977, 1983) as the association *Oleo-Euphorbietum dendroidis coronilletosum emeroidis* Trinajstić 1973, fragmentarily developed without any indication of its floral composition. In 1989, this association was found on the island of Dugi otok (cf. Trinajstić and Vrbeč 1992), that is so far its most northern habitat in the eastern part of the Adriatic Basin.

The ass. *Oleo-Euphorbietum dendroidis* is spreading also in the western Mediterranean (cf. Trinajstić 1973, 1975, 1977), and it is known from the Salerno Peninsula and from the small islands in the Bays of Salerno and Napoli (cf. Trinajstić and Šugar 1977), from Monte Conero near Ancona as fragmentarily developed (cf. Brilli-Cattarini 1965, 1969, 1971, Trinajstić 1984), then from the Gulf of Corinth in Greece near Monastiraka and from Crete, this being its most eastern habitat known until now (cf. Biondi and Géhu 1987, Horvat *et al.* 1974).

## METHODS

Both published and unpublished data were used. The vegetational relevés were made and elaborated according to the standard procedures of the Braun-Blanquet method (Braun-Blanquet 1964). The nomenclature of plant species follows Tutin *et al.* (1964–1980).

Numerical analysis (principal coordinates analysis using similarity ratio as resemblance) of all relevés was performed using the programme package SYN-TAX 2000 (Podani 2001). The relevés were made by using the Braun-Blanquet sampling scale, which has been transformed into the ordinal 0–9 scale according to Van der Maarel (1979).

## RESULTS AND DISCUSSION

### Ass. *Oleo-Euphorbietum dendroidis* Trinajstić 1973

During the latest floristical researches of Kornati Islands, the association *Oleo-Euphorbietum dendroidis* has been discovered on the islands of Donja Sikica, Pleščina, Mana and Vela Sestrica (cf. Fig. 1). The floral composition of

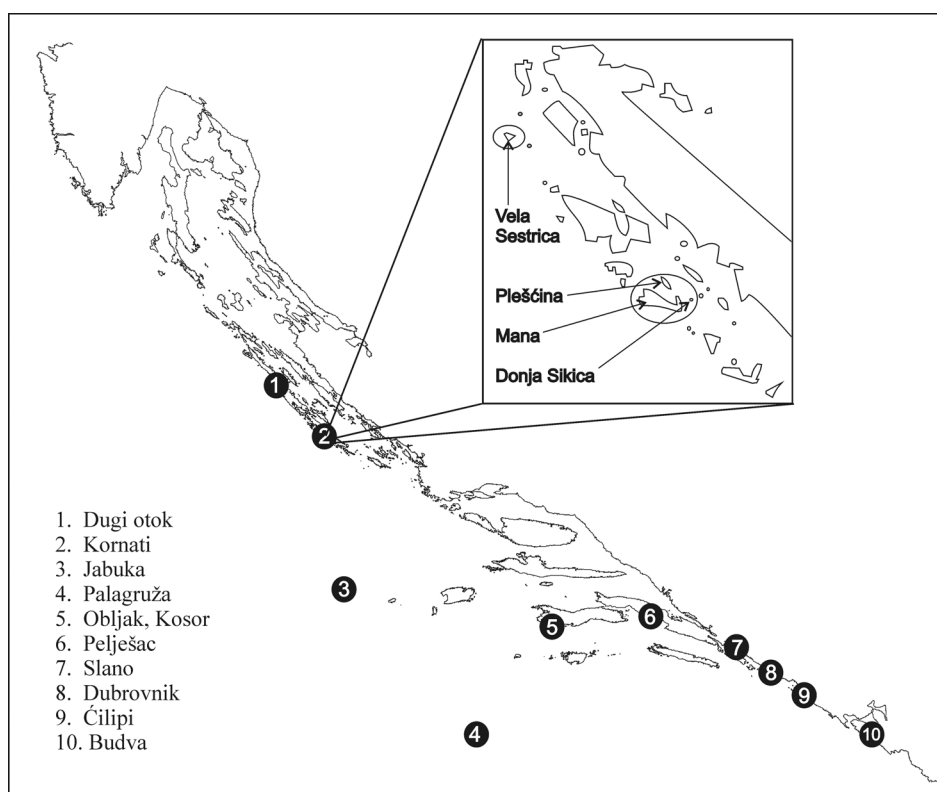


Fig. 1. Previous and new localities of ass. *Oleo-Euphorbietum dendroidis* Trinajstić 1973 in the eastern Adriatic basin

Table 1  
Ass. *Oleo-Euphorbietum dendroidis* Trinajstić 1973 on the Kornati Islands

No. of relevé*	1	2	3	4	5	6	7	8	9
Surface (m <sup>2</sup> )	400	400	200	300	400	200	200	300	300
Total cover (%)	100	80	90	100	90	90	100	100	90
No. of species	13	9	12	9	9	7	11	11	8
<b>Char. Ass.</b>									
<i>Euphorbia dendroides</i> L.	2.2	2.2	2.2	2.3	2.2	2.2	2.2	1.2	1.2
<i>Prasium majus</i> L.	+	.	+	.	.	.	+	+	.
<i>Ephedra fragilis</i> Desf. subsp. <i>campylopoda</i> (C. A. Meyer) Aschers. et Graebn.		1.2	.	+	.	.	.	.	.
<b>Diff. Subass. coronilletosum emeraldoidis</b>									
<i>Coronilla emeroides</i> Boiss. et Spruner.	+	+	+2	.	1.2	+2	1.2	.	+
<b>Char. All. Oleo-Ceratonion</b>									
<i>Pistacia lentiscus</i> L.	3.4	3.4	3.3	2.3	3.4	3.4	2.3	2.3	3.4
<i>Olea sylvestris</i> L.	2.2	+2	.	+2	+	+2	.	.	1.2
<i>Pinus halepensis</i> Miller	.	.	.	.	.	.	.	2.3	.
<b>Char. Order Quercetalia ilicis et Char. Class. Quercetea ilicis</b>									
<i>Smilax aspera</i> L.	1.3	1.2	1.3	1.2	+	1.2	1.2	1.3	+
<i>Asparagus acutifolius</i> L.	+	+	+	+	+	+	+	+	+
<i>Rubia peregrina</i> L.	1.1	.	1.1	.	+	.	.	1.1	.
<i>Lonicera implexa</i> Aiton	1.2	.	+	.	.	.	+2	.	.
<i>Clematis flammula</i> L.	.	+2	.	.	.	.	+2	.	.
<i>Ruscus aculeatus</i> L.	+	.	.	.	.	.	+	.	.
<b>Comp.</b>									
<i>Brachypodium retusum</i> (Pers.) Beauv.	+	+	+2	+2	1.2	+	+	2.2	1.2
<i>Asphodelus microcarpus</i> Salzm. et Viv.	.	.	+	.	1.1	.	+	+	1.1
<i>Ruta graveolens</i> L.	+2	.	+2	+2	.	.	.	.	.
<i>Convolvulus cneorum</i> L.	1.2	.	1.2	.	.	.	.	.	.
<i>Piptatherum miliaceum</i> (L.) Cosson	.	.	.	.	.	.	.	1.2	.
<i>Geranium purpureum</i> Vill.	.	.	.	.	.	.	.	+	.
<i>Tamus communis</i> L.	.	.	.	+	.	.	.	.	.

\*Localities: 1, 3 = Donja Sikica; 2, 4, 6 = Pleščina; 5, 9 = Mana; 7, 8 = Vela Sestrica

ass. *Oleo-Euphorbietum dendroidis* from Kornati is given in Table 1, where nine relevés are included. The relevés originate from the following localities:

1. The small island of Donja Sikica – the stand in the rocks on the flat ground in the central part of this small island. The stands of the species *Euphorbia dendroides* and of wild olive (*Olea sylvestris*) are 90–100 cm high.
2. The western part of the island of Pleščina – on the 20° sloping ground, in the rocky soil.
3. The western part of the small island of Donja Sikica – the stands are about 50 cm high.
4. The southern part of the island of Pleščina. The adjacent area was burnt in 1996. The trees of *E. dendroides* are up to 140 cm high and very large.
5. The eastern part of the island of Mana.
6. The central part of the island of Pleščina.
7. The southern part of the island of Vela Sestrica.
8. The western part of the island of Vela Sestrica. Any further expansion of this association is hindered by the rapid expansion of the Aleppo pine.
9. The hill above the Mana island port – developed on rocky soil.

#### *Floral composition*

The stands of ass. *Oleo-Euphorbietum dendroidis* on the Kornati Islands are developed in the cracks on rocks as well as on the slopes with the south to west exposition. The most abundant stands of this association in the researched area are on the island of Pleščina. The analysed stands have a total of 20 species out of which 13 are characteristic for individual syntaxonomic units. The average number of species per relevé is 10 (7–13), similarly as for the relevés from Dugi otok which also are poorer in the number of species than those from the southern Dalmatia or from Montenegro (cf. Trinajstić 1973, 1984, 1985, 1989, Pavletić 1983, Trinajstić and Pavletić 1990, Trinajstić and Vrbek 1992). Of the species characteristic for the association dominant is the *Euphorbia dendroides*. Early in summer this species loses leaves and its shrubs become copper-red, but with the first autumn rains it begins to leaf and then all association is blue-greenish from the typical colour of its leaves. It flowers in winter. Because of such properties, the association is easily identifiable on spot.

For the occurrence and development of this association on the Kornati Islands the most important ecological factors are climatic conditions (temperature and precipitation). The vegetation of alliance Oleo-Ceratonion in the Mediterranean region is explained by Molinier (1954) by a relationship between the mean minimum temperatures in the coldest month ( $m$ ), the mean maximum temperature in the warmest month ( $M$ ) and the total annual precipitation ( $P$ ). According to Molinier (1954), Emberger expressed the pluviometric quotient ( $Q$ ) by the formula  $Q = (P/M^2 - m^2) \times 100$ . On the Kornati Islands, the weather reporting station on Vela Sestrica is only a few metres far from the

described vegetation relevés nos 7 and 8 (cf. Table 1 and Fig. 1). The pluviometric quotient in 1994 for Vela Sestrica was  $Q = 76.4$ . According to Emberger, the pluviometric quotient does not exceed 100, and these are climatic pre-conditions for the development of the vegetation of alliance Oleo-Ceratonion within the steno-Mediterranean vegetation zone. The weather reporting station on Vela Sestrica is positioned rather high and exposed to the strong north-eastern wind bora, meaning that the microclimatic conditions of ass. *Oleo-Euphorbietum dendroidis* are better than those according to the data supplied by the weather reporting station.

Of characteristic species of alliance Oleo-Ceratonion dominant in ass. *Oleo-Euphorbietum dendroidis* are *Pistacia lentiscus* and *Olea sylvestris*. *Pinus halepensis* has not been noticed on the majority of the Kornati Islands, while on the island of Vela Sestrica it is of anthropogenic origin and is spreading spontaneously. The characteristic species of the order Quercetalia ilicis and the class Quercetea ilicis are represented by a small number, unlike the *Smilax aspera*, *Asparagus acutifolius* and *Rubia peregrina* which show a high level of presence (Table 1). *Pistacia lentiscus* and *Olea sylvestris* from the alliance Oleo-Ceratonion are dominant in the Kornati stands, that indicates optimal ecological conditions. Among the accompanying species *Brachypodium retusum* is dominant in many heliophilous associations within its range along the eastern Adriatic coast.

To obtain an as clear idea as possible of the structure of ass. *Oleo-Euphorbietum dendroidis* in the large area of the eastern Adriatic Littoral, in addition to the relevés from Kornati (Table 1), for the purpose of floral composition comparison all relevés from the eastern Adriatic coast known in the literature have been included, too, and they are united in Table 2 (the relevés from the islands of Obljak, Kosor, Jabuka and Palagruža, the Pelješac Peninsula, the Dubrovnik and Montenegrin Littorals, as well as from the island of Dugi otok). For 20 so far published relevés (Table 2), the authors (Trinajstić 1984, Trinajstić and Pavletić 1990, Trinajstić and Vrbek 1992) indicate a total of 60 species, the average number of species per relevé being 16 (5–27). The association itself is represented by the subass. *coronilletosum emeroidis* which is significant for the eastern Adriatic range of ass. *Oleo-Euphorbietum dendroidis* (cf. Trinajstić 1973, 1975, 1984), although from Table 2 it is seen that three relevés (18, 19 and 20) from Jabuka and Palagruža, due to the absence of differential species of subass. *coronilletosum emeroidis*, correspond more to the subass. *typicum* (cf. Table 2 and Trinajstić 1975). Such allegation is supported also by the numerical analysis of the earlier published and new relevés (Fig. 2) where a separation of these three relevés from the others is clearly visible. Similarly, from the relevé 3 the geographical separation of other relevés is clearly noticeable, with separately

Table 2  
Previously described localities of the ass. *Oleo-Euphorbietum dendroidis* Trinajstić 1973 in the east Adriatic basin. Legend: K = Kosor, P = Pelješac, Dubr. = Dubrovnik, Dug. = Dugi otok, Pal = Palagruža, J = Jabuka

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Locality	Objak																			
Subass.	K																			
No. of species	P																			
	Slano Dubr. Čilipi Budva Dug. Pal J																			
	<i>coronilletosum emeroideis</i>																			
	<i>typicum</i>																			
<b>Char. Ass.</b>																				
<i>Euphorbia dendroides</i> L.	2.3	1.2	2.2	4.2	1.2	2.2	2.3	2.3	+2	3.3	3.3	2.3	3.3	3.3	3.3	+2	1.2	4.4	3.3	2.3
<i>Ephedra fragilis</i> Desf. subsp. <i>campylopoda</i> (C. A. Meyer) Aschers. et Graebn.	1.3	2.2	+3	+	2.3	.	+2	.	2.3	2.3	.	3.4	+3	1.3	2.2	.	1.3	.	.	.
<i>Prasium majus</i> L.	2.3	2.3	+3	+3	.	.	.	.	+2	.	.	+2	.	.	.	.	+3	.	+2	+
<b>Diff. subass. coronilletosum emeroideis</b>																				
<i>Coronilla emeroideis</i> Boiss. et Spruner.	+	+	1.1	1.1	+2	2.2	2.3	+2	+2	+2	.	+2	2.2	+2	+	+2	.	.	.	.
<i>Pistacia terebinthus</i> L.	+	+	1.1	+2	+	(+)	1.1	+2	+2	.	.	.	+	+2	1.2	.	.	.	.	.
<i>Colutea arborescens</i> L.	+	+	+	(+)	.	(+)	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Punica granatum</i> L.	.	.	.	.	.	+	.	2.2	.	.	.	.	+	.	2.2	.	.	.	.	.
<i>Paliurus spina-christi</i> Miller	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Char. All. Oleo-Cerantonion</b>																				
<i>Pistacia lentiscus</i> L.	1.2	2.3	2.2	2.3	3.3	3.3	2.2	3.4	+	2.3	3.4	.	.	.	.	3.3	1.1	(+)	.	1.2
<i>Olea sylvestris</i> L.	3.4	4.4	4.4	1.2	4.4	3.3	1.1	+2	2.3	+	.	+2	2.3	+3	1.3	+2	1.1	+2	+	+
<i>Myrtus communis</i> L.	.	.	.	2.3	.	2.3	.	+3	2.3	+2	3.3	+2	+	.	.	.	.	.	.	.
<i>Ceratonia siliqua</i> L.	.	.	.	.	+	+2	+2	1.2	2.2	3.3	.	.	.	.	.	.	.	.	.	.
<i>Arisarum vulgare</i> Targ.-Tozz.	+	1.2	(+)	+3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Juniperus phoenicea</i> L.	.	.	.	(+)	.	(+)	2.3	1.2	+3	.	.	.	.	.	.	.	.	1.2	1.2	.
<i>Coronilla valentina</i> L.	.	.	.	.	.	+	.	.	+2	1.2	.	.	.	.	.	.	.	+2	2.2	.
<i>Calycotome villosa</i> (Poir.) Lk.	.	.	.	.	.	.	.	2.3	4.4	1.2	.	.	.	.	.	.	.	.	.	.
<i>Opuntia ficus-indica</i> (L.) Miller	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Locality	Obljak																				
Subass.	K																				
No. of species	16																				
	coronilletesium emeroidis																				
	Slano Dubr. Čilipi Budva Dug. Pal J																				
	typicum																				
<i>Chamaerops humilis</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Olea europaea</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Char. O., Class Quercetalia ilicis and Quercetia ilicis</b>																					
<i>Smilax aspera</i> L.	1.3	2.3	1.3	+2	.	3.3	2.3	1.1	1.2	.	1.3	.	+3	+2	+3	1.3	1.3	.	.	.	
<i>Rubia peregrina</i> L.	1.3	1.3	2.3	(+)	.	+	.	+2	.	+	+2	.	1.3	+2	.	.	.	.	.	.	
<i>Asparagus acutifolius</i> L.	1.2	.	1.3	+2	.	.	1.1	.	1.3	.	.	.	.	+2	+2	.	.	.	.	+	
<i>Lonicera implexa</i> Aiton	.	.	+2	1.3	.	1.1	.	.	1.2	(+)	1.2	.	.	+2	1.3	+2	.	.	.	.	
<i>Phillyrea media</i> L.	+	(+)	.	.	.	2.3	.	.	3.3	2.2	.	+3	+2	.	+2	.	.	.	.	.	
<i>Laurus nobilis</i> L.	+	1.2	1.2	.	1.2	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	
<i>Ruscus aculeatus</i> L.	+3	.	+	(+)	.	.	.	.	+3	.	.	.	+2	.	.	.	.	.	.	.	
<i>Ostrya alba</i> L.	.	.	.	.	1.3	.	2.3	1.2	+2	1.3	.	+2	.	.	.	.	.	.	.	.	
<i>Rhamnus alaternus</i> L.	.	.	.	.	.	.	.	.	2.2	+	.	.	.	.	.	.	.	.	.	.	
<i>Teucrium flavum</i> L.	.	(+)	.	.	.	.	.	.	+3	.	.	.	.	1.2	.	+2	.	.	.	.	
<i>Quercus ilex</i> L.	.	.	+	1.1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	
<i>Juniperus macrocarpa</i> Sibth. et Sm.	.	.	.	.	.	.	1.2	1.1	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Arbutus unedo</i> L.	.	.	.	2.3	.	.	.	.	.	.	.	1.3	.	.	.	.	.	.	.	.	
<i>Phillyrea latifolia</i> L.	.	.	.	.	.	.	1.2	+	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Spartium junceum</i> L.	.	.	.	.	.	2.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Quercus coccifera</i> L.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Rosa sempervirens</i> L.	.	.	.	.	(+)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
<b>Comp.</b>																					
<i>Brachypodium retusum</i> (Pers.) Beauv.	.	2.3	(+)	2.3	.	2.3	2.3	+	3.3	.	3.3	+2	2.3	.	.	+3	2.3	.	.	.	
<i>Piptatherum miliaceum</i> (L.) Cosson	.	.	.	+3	(+)	+3	.	+2	2.3	.	+3	.	.	.	.	.	.	.	.	.	



No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Locality	Obljak																				
Subass.	K P Slano Dubr. Čilipi Budva Dug. Pal J																				
No. of species	16 16 20 22 15 21 18 19 27 16 7 14 15 15 13 12 12 12 11 5																				
<i>Ruta graveolens</i> L.	.	.	.	.	+	.	1.1	+	+2	.	.	.	.	.	.	.	.	.	.	.	
<i>Asphodelus microcarpus</i> Salzm. et Viv.	.	.	.	+	1.2	1.3	.	.	+	.	.	.	.	.	.	.	.	.	.	+	
<i>Ficus carica</i> L.	.	.	.	.	.	+	.	.	1.2	.	.	+	+2	+2	.	.	.	.	.	.	
<i>Geranium purpureum</i> Vill.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Allium subhirsutum</i> L.	.	.	.	.	+	.	.	.	+3	+3	.	.	.	.	.	.	.	.	.	.	
<i>Tamus communis</i> L.	2.3	2.3	2.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
<i>Convolvulus cneorum</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1.2	.	.	1.3	
<i>Seseli globiferum</i> Vis.	.	.	.	.	.	.	.	.	.	.	.	+	.	+2	.	.	.	.	.	.	
<i>Cymbopogon hirtus</i> (L.) Janchen	.	.	.	.	.	.	.	.	.	.	.	+2	.	.	.	.	.	.	.	.	
<i>Matthiola sinuata</i> (L.) R. Br.	.	.	.	.	.	.	.	.	.	.	.	.	.	+2	.	.	.	.	.	.	
<i>Inula viscosa</i> (L.) Aiton	.	.	.	.	.	.	.	.	.	.	.	.	.	+2	.	.	.	.	.	.	
<i>Vitis sylvestris</i> Gmel.	.	.	.	.	.	.	.	.	.	.	.	.	.	+2	.	.	.	.	.	.	
<i>Artemisia arborescens</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	2.2
<i>Capparis spinosa</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+2	+2
<i>Matthiola incana</i> (L.) R. Br.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	+2
<i>Daucus gummifer</i> var. <i>hispanicus</i> (Gouan) Hayek	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1.2
<i>Alyssum leucadeum</i> Guss.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2
<i>Sedum rubens</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+2	+
<i>Lavatera arborea</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	.
<i>Parietaria judaica</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2
<i>Reichardia picroides</i> (L.) Roth	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2
<i>Lagurus oeratus</i> L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1

united the central Dalmatian relevés (Dugi otok and Kornati) and separately united the south Dalmatian and Montenegrin relevés.

In their floral composition the Adriatic stands comprise some deciduous elements either, among which distinguished by the level of their presence are *Coronilla emeroides* and *Pistacia terebinthus*. Of these species *C. emeroides* only is present on Kornati. From Table 1 it can be seen that the Kornati stands include all characteristic species of association which are comprised in the analogue stands from Table 2. The same characteristics are in the order *Quercetalia ilicis* and the class *Quercetea ilicis*. Although the species *Euphorbia dendroides* grows on a distinctly rocky soil yet its stands do not contain the elements of rock vegetation, instead dominant in them are typical elements of the alliance *Oleo-Ceratonion*. On the island of Plešćina, the small trees of *E. dendroides* reach the height of 1.5 m and the diameter of 10–15 cm, and *Olea sylvestris* produces very ramified and abundant small trees of approximately the same dimensions.

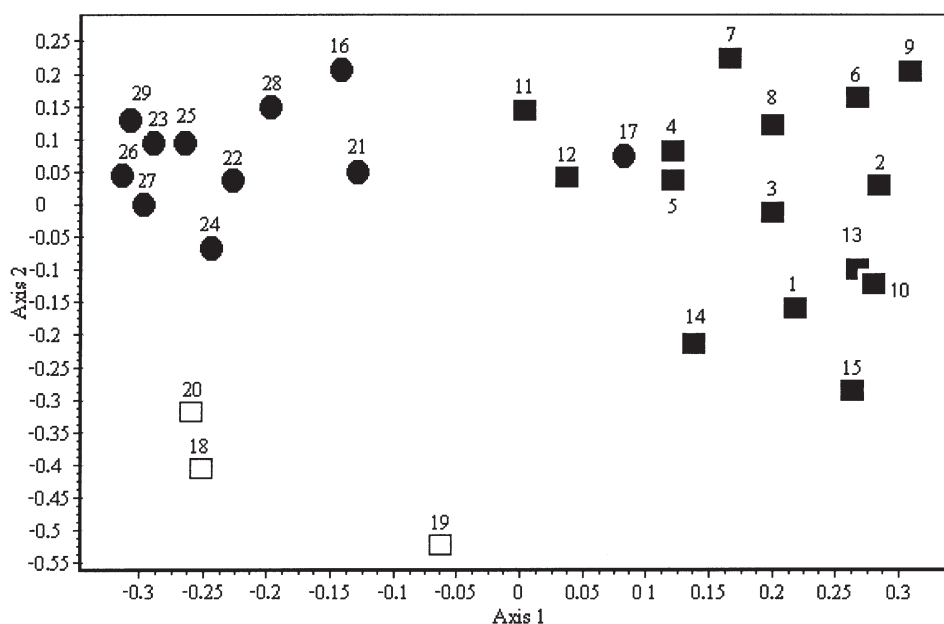


Fig. 2. Principal coordinate analysis of relevés of ass. *Oleo-Euphorbietum dendroidis* Trinajstić 1973. Numbering corresponds to Tables 1 and 2. Legend: ■ = subass. *coronilletosum emeroidis* from south Dalmatia and Montenegro; ● = subass. *coronilletosum emeroidis* from central Dalmatia; □ = subass. *typicum*

## CONCLUSION

During the latest research of the Kornati Islands, the ass. *Oleo-Euphorbietum dendroidis* has been discovered on the islands of Donja Sikica, Pleščina, Mana and Vela Sestrica. On the Kornati Islands, the stands of ass. *Oleo-Euphorbietum dendroidis* grow in cracks on the rocks and on the slopes with the south–west exposition. The most abundant stands of this association in the researched area are on the island of Pleščina. The analysed stands have a total of 20 species out of which 13 are typical for individual syntaxonomic units, the average number of species per relevé being 10 (7–13). Of the species characteristic for this association dominant is *Euphorbia dendroides*. Of the highest importance for the occurrence and development of this association on Kornati are ecological factors determined by the climatic characteristics ( $Q = 76.4$ ). The association itself is represented by the subass. *coronilletosum emeroidis*.

From all so far known relevés of ass. *Oleo-Euphorbietum dendroidis* in the eastern Adriatic Littoral it can be seen that three relevés from Jabuka and Palagruža, due to the absence of differential species of the eastern Adriatic subass. *coronilletosum emeroidis* correspond more to the subass. *typicum*. This allegation is supported also by the numerical analysis of the earlier published and new relevés, which shows clearly the separation on a very high level of these three relevés from the others. Moreover, in Figure 2 the geographical separation of other relevés is clearly noticeable, with separately united the central Dalmatian relevés (Duži otok and Kornati) and separately united the south Dalmatian and Montenegrin relevés.

\*

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