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ASSOCIATION *OLEO-EUPHORBIETUM DENDROIDIS* TRINAJSTIĆ 1973 (*OLEO-CERATONION*) IN THE VEGETATION OF THE ISLAND OF DUGI OTOK, CROATIA

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In this paper the data pertaining to the floristic composition and structure of the association *Oleo-Euphorbietum dendroidis* on Dugi otok are given. During natural science researche on Dugi otok in 1989, the association *Oleo-Euphorbietum dendroidis*, a new community in the vegetation of Dugi otok was discovered. It is the most northerly locality of this community known until now in the east Adriatic basin. The floristic composition of the association *Oleo-Euphorbietum dendroidis* on Dugi otok, presents all the most important characteristic species of the association, of the alliance *Oleo-Ceratonion*, of the order *Quercetalia ilicis* and of the class *Quercetea ilicis*, with the predomination of those species which, with regard to the ecology of seed dissemination, are spread in the ornithohornous manner.

Key words: Association, *Oleo-Euphorbietum dendroidis*, Island of Dugi otok, Croatia.
Abbreviation: as. = association

U radu se iznose podaci o flornom sastavu i građi asocijacije *Oleo-Euphorbietum dendroidis* na Dugom otoku. Tijekom prirodoznanstvenih istraživanja na Dugom otoku 1989. godine otkrivena je, između ostaloga, i asocijacija *Oleo-Euphorbietum dendroidis*, nova zajednica u vegetaciji Dugog otoka. To je najsjevernije do sada poznato nalazište navedene zajednice u istočnom dijelu jadranskog bazena. U flornom sastavu asocijacija *Oleo-Euphorbietum dendroidis* na Dugom otoku zastupljene su sve najvažnije karakteristične vrste asocijacije, sveze *Oleo-Ceratonion*, reda *Quercetalia illicis* i razreda *Quercetea ilicis*, s dominacijom onih vrsta koje se u pogledu ekologije rasijavanja sjemena šire ornitohorno.

Ključne riječi: Asocijacija, *Oleo-Euphorbietum dendroidis*, Dugi otok, Hrvatska.
Kratica: as. = asocijacija

INTRODUCTION

In June 1989, the Croatian Natural History Museum in Zagreb organized scientific field researche on Dugi otok in which both botanists and zoologists were involved. During this researche among other things abundant herbarial material was gathered on the basis of which knowledge of the flora of Dugi otok was completed (TRINAJSTIĆ 1991) and the as. *Oleo-Euphorbietum dendroidis*, a new one in the vegetation of that

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island, was discovered. Since the as. *Oleo-Euphorbietum dendroidis* was described (TRINAJSTIĆ 1973), this community has been discovered on a large number of localities in the eastern part of the Adriatic basin (TRINAJSTIĆ 1975, 1984, GAŽI-BAŠKOVA and BEDALOV 1983, FASCETTI and VERI 1984, TRINAJSTIĆ and ZI. PAVLETIĆ 1991), and in some other parts of the Mediterranean (BRULLO and MARCENÒ 1984, BIONDI and GÉHU 1987), also.

The northernmost, fragmentarily developed, stands of the as. *Oleo-Euphorbietum dendroidis* known so far were discovered on the small island of Mana in the Kornati archipelago (GAŽI-BAŠKOVA and BEDALOV 1983), although the species *Euphorbia dendroides* was known from before in the flora of Dugi otok and in that of the Kornati islands also (PEVALEK 1930, GAŽI-BAŠKOVA 1981, TRINAJSTIĆ 1986). The typically developed stands of the as. *Oleo-Euphorbietum dendroidis* discovered on Dugi otok are at present the most northerly point of its range in the Adriatic basin and as such deserve our attention. We therefore deemed it necessary to proceed with a more detailed analysis of their floristic composition.

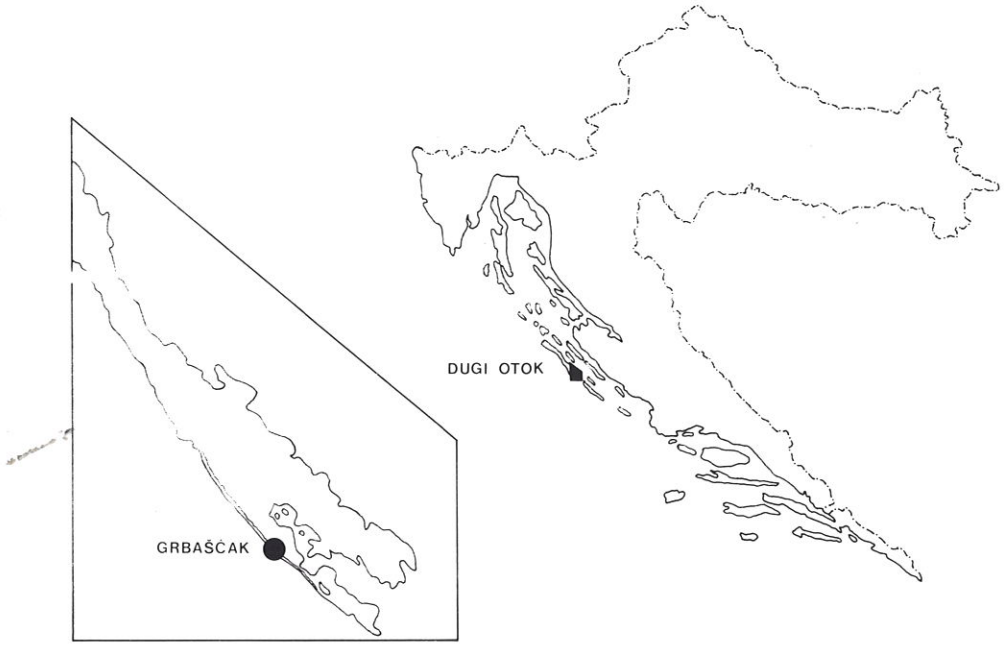

Fig.1. Locality of the association *Oleo-Eupherbietum dendroidis* on Dugi otok (indicated by a dot).

THE ASSOCIATION *OLEO EUPHORBIETUM DENDROIDIS* ON DUGI OTOK

Several kilometers along the foot of the vertical rocks in the wider region of Grbašćak (UTM co-ordinates WJ16), protected from cold winds, and

especially from the stormy north-eastern wind (bora), there have developed from the floristic aspect very typically built stands of the as. *Oleo-Euphorbietum dendroidis* (Fig. 1). They grow on terraces or slopes of clastic sedimentary material which has been broken and crushed by the action of atmospheric agents and which then falls from the rocks. The stands of the as. *Oleo-Euphorbietum dendroidis* are inaccessible from the land, and practically cannot be seen from that side, but from the sea they are clearly visible and easily accessible when the sea is smooth. In late spring and early summer, they are revealed by the copper-red colour of the species *Euphorbia dendroides* which at that time of the year sheds its leaves. In autumn and winter they are characterized by the blue-green colour of leaves just put forth on bushes and small trees of the same species.

The floristic composition of the as. *Oleo-Euphorbietum dendroidis* is shown in table 1 and it is bases on two plantsociological records made in the wider region of Grbašćak representing two independently developed stands. For comparison purpose, the complete floristic composition of the as. *Oleo-Euphorbietum dendroidis* as known to date in the east Adriatic littoral on the basis of 16 plantsociological records (TRINAJSTIĆ 1985), not including the records from Dugi otok, is attached, in the form of a synthetic review.

DISCUSSION

Because of the ecological features of the species that are characteristic for the alliance *Oleo-Ceratonion*, habitats in which communities of this alliance are developed are xerothermal. This xerothermality can either be conditioned by characteristics of the general climate, such as exist, for instance, in parts of Sicily and Sardinia, and also in some parts of the Mediterranean, or reflect the local and microclimate conditions.

In the east Adriatic littoral *Euphorbia dendroides* is found mainly on the edge its whole range (comp. TRINAJSTIĆ 1986), so that no large surfaces of the Croatian littoral are covered either by the as. *Oleo-Euphorbietum dendroidis* or by the alliance *Oleo-Ceratonion*. However, due to the specific orography of the islands and the coast in Croatian littoral, all parts of some islands and of the southern costal zone (e. g. the coast of Dubrovnik) which are on one side turned toward the south or south-west and on the other side protected from the bora, have a markedly xerothermic local climate or a xerothermic microclimate. So, for instance, the islands of Vis, Biševo and Lastovo have almost completely the subhumide type of Mediterranean climate typical for the zone of the alliance *Oleo-Ceratonion*, while the islands of Šolta, the southern part of Brač, the larger part of Hvar, Korčula and Mljet have a local semi-humid climate.

As far as Dugi otok is concerned, its south-west coastal areas have partly the local climate and partly the microclimate, typical for the zone of the alliance *Oleo-Ceratonion*, as a result of the orography. Indeed, the entire coastal belt at the foot of the vertical rocks of Grbašćak is protected against the bora which during winter causes a fall of temperature while any significant fall of temperature is also prevented in winter by the proximity of deep sea.

Tab. 1. As. *OLEO-EUPHORBIETUM DENDROIDIS* Trinajstić 1973

Nr. of Veget. Record:	1	2	Σ16
Size of Veget. Record / m^2:	100	500	-
Char. As.:			
Euphorbia dendroides	+.2	1.2	V
Ephedra fragilis subsp. campylopoda	.	1.3	III
Prasium majus	.	+.3	II
Diff. Subas. *coronilletosum emeroidis*:			
Coronilla emeroides	+	+.2	IV
Pistacia terebinthus	.	.	IV
Colutea arborescens	.	.	II
Punica granatum	.	.	I
Paliurus spina-christi	.	.	I
Char. All. *Oleo-Ceratonion*:			
Olea sylvestris	+.2	1.1	V
Pistacia lentiscus	3.3	1.1	V
Myrtus communis	.	.	III
Ceratonia siliqua	.	.	II
Arisarum vulgare	.	.	II
Juniperus phoenicea	1.2	1.2	II
Coronilla valentina	+.2	2.2	II
Calycotome villosa	.	.	I
Artemisia arborescens	.	.	I
Opuntia ficus-indica	.	.	I
Chamaerops humilis	.	.	I
Olea europaea	.	.	I
Pinus halepensis	1.3	1.2	
Anthyllis barba-jovis	.	+.2	
Char. Order *Quercetalia ilicis* & Char. Class *Quercetea ilicis*:			
Smilax aspera	1.3	1.3	IV
Rubia peregrina	.	.	III
Asparagus acutifolius	.	.	II
Laurus nobilis	.	.	II
Lonicera implexa	+.2	.	II
Phillyrea media	.	.	II
Ruscus aculeatus	.	.	II
Osyris alba	.	.	II
Quercus ilex	.	.	I
Juniperus macrocarpa	.	.	I
Phillyrea latifolia	.	.	I
Teucrium flavum	+.2	.	I
Rhamnus alaternus	+.2	1.1	I
Arbutus unedo	.	.	I
Spartium junceum	.	.	I
Quercus coccifera	.	.	I
Rosa sempervirens	.	.	I

Nr. of Veget. Record:	1	2	Σ16
Size of Veget. Record / m^2:	100	500	-
Brachypodium retusum	+.3	2.3	*III*
Piptatherum miliaceum	.	.	*II*
Ruta graveolens	.	.	*II*
Asphodelus microcarpus	.	.	*II*
Tamus communis	.	.	*I*
Ficus carica	.	.	*I*
Allium subhirsutum	.	.	*I*
Geranium purpureum	.	.	*I*
Convolvulus cneorum	+	1.2	

On the other hand, as already pointed out, the genesis of the communities of the alliance *Oleo-Ceratonion* is closely connected with ornithochory (TRINAJSTIĆ 1984), since most species that build vegetation of the said alliance have succulent fruits (berries, stone-fruits) serving as food for birds which thus spread them. In places with favorable ecological conditions the scattered seeds begin to grow and plants to develope that in the end give rise to the development of a complete community. Where no such conditions exist, either seeds do not grow at all or a young plant dies later from cold. The radius of movement of birds being large, the as. *Oleo-Euphorbietum dendroidis* in the vast area of the Mediterranean is built in a very homogenous and uniform manner, representing, however, at the same time a reliable indicator of recent climate conditions. For this reason the as. *Oleo-Euphorbietum dendroidis* and communities of the alliance *Oleo-Ceratonion* in general represent a very interesting and important subject for scientific researche from the point of view of natural science.

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