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EPIPHYTIC FLORA ON LEAVES OF *POSIDONIA OCEANICA* (L.) DELILE FROM THE AREA OF DUBROVNIK (SOUTH ADRIATIC)

EPIFITSKA FLORA NA LIŠĆU *POSIDONIA OCEANICA* (L.) DELILE NA PODRUČJU DUBROVNIKA (JUŽNI JADRAN)

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Samples were collected at 7 transects from 5 to 35 m depths in the area of Dubrovnik at different time intervals from 1977 to 1983. A total of 123 taxa (Cyanophyta and Diatomeae were not studied) were determined. Rhodophyta group are predominant with 87 taxa (70.7%) followed by Phaeophyta with 22 (17.9%) and Chlorophyta with 14 taxa (11.4%). The lergest number of epiphytic algae (86) was found at 15 m depth. At all depth Rhodophyta were dominant and mainly followed by the taxons of Phaeophyta and Chlorophyta. The taxa that occur cotinuously at all depths were established, as well as very fraquent taxa but not found at all depths, very rare taxa and taxa with discontinuous distribution. Preliminary seasonal distribution showed the taxa present in epiphytic flora all yaer round and taxa present in single or more seasons.

INTRODUCTION

This paper reports for the first time on the qualitative-quantitative composition, depth and seasonal distribution of epiphytic flora on the leaves (mainly live) of *Posidonia oceanica* from localities in the eastern Adriatic coastal area.

The papers published by earlier authors which studied benthic flora of the eastern Adriatic coast (Zanardini, 1871—1876; Hauck, 1885; Lorenz, 1863; Feldman, 1942; Ercegović, 1957, 1960, 1964; Šipan, 1980) only mentioned *Posidonia oceanica* as (host plant) of individual algal species, an no one gave detailed account of epiphytic flora.

Apart from some macrobenthic algae (species of genus *Cystoseira, Halimeda, Vidalia* and others) marine phanerogam *Posidonia oceanica* is one of

the most significant hosts of epiphytic flora in the Adriatic. Significance of epyphitism on this phanerogam species is due to the fact that its beds are developed on mobile infralittoral bottoms (gravelly-sandy, sandy, and sandy-muddy bottoms) where benthic algae are quantitatively and qualitatively poorly represented.

Abundance and diversity of epiphytic flora on *Posidonia oceanica* species are closely related to ecological conditions at the location in the sea they inhabit (sea water transparency, quality and quantity of light, temperature, salinity) and of the part of the plant they are developed on (live or dead leaves, live or dead rhyzomes).

Results brought out in this paper report only on a small part of the researches of *Posidonia oceanica* beds along the eastern Adriatic started in 1979.

STUDY AREA, MATERIALS AND METHODS

Samplings were performed at 7 transects in the area of Dubrovnik (on islands Koločep, Daksa and Lokrum and on the coast at capes Bat, Petka and Lapad) at different time intervals from 1977 to 1983. (Fig. 1).

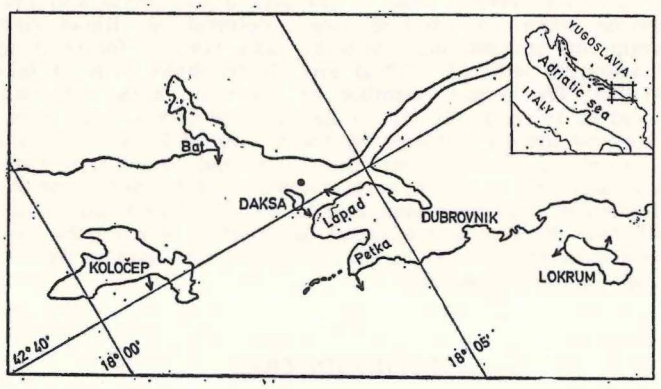

Fig. 1. — Study area
→ transects
• hydrographyc station

Material was collected by the methods of direct (S c u b a diving from surfaces 50 cm × 50 cm) and indirect samplings (dredge) from 5 to 35 m depths and preserved in 4% formaldehide. Epiphytes were determined by binocular magnifier and microscopy mainly from live leaves of *Posidonia oceanica.*

Since ecological properties of the study area (temperature, salinity, sea water density, vertical *Posidonia* distribution, biomass per unit area, classi-

fications of *Posidonia* beds at different depths) affect the abundance and diversity of epiphytic flora on *Posidonia oceanica* leaves some of them are going to be described here.

Temperature. — Annual mean temperature at the studied station (Daksa Island) varied from 12.7°C (winter) to 23.16°C (summer) at surface from 12.19°C (winter) to 21.08°C (summer) at 10 m depth, from 13.00°C (winter) to 18.90°C (summer) at 20 m and from 13.08°C (winter) to 18.45°C (autumn) at 35 m depth during the period of investigations.

Salinity. — During the same period at the same station annual salinity means varied from 34.22‰ (spring) to 37.42‰ (autumn) at surface, from 37.48‰ (winter) to 38.21‰ (summer) at 10 m depth, from 35.55‰ (winter) to 38.62‰ (summer) at 20 m depth and from 37.95‰ (winter) to 38.96‰ (spring) at 35 m depth.

Sea water transparency. — Sea water transparency mean (transparency measured by Secchi disc, 50 cm diameter) varied from 13 m (spring) to 15 m (summer).

Depth bed distribution. — Beds of *Posidonia oceanica* show different depth distributions in the study area. Near the Daksa Island and Bat and Lapad capes beds stretch from 5 to 25 m depth, near Lokrum Island from 5 to 35 m and near Petka Cape and Koločep Island from 10 to 35 m depths.

Biomass. — Biomass (fresh weight of live plants per square metre) is strongly decreased with increased depth. At 5 m depth biomass is about 10 500 g/m^2 and at 30 m about 1 600 g/m^2.

Classification of beds. — G i r a u d (1977) classified the *Posidonia oceanica* beds on the basis of shoots covering 1 m^2 (I stage — more than 700 shoots/m^2 — very dense beds; II stage — betwen 400 and 700 /699/ shoots/m^2 — dense beds; III stage — betwen 300 and 400/399/ shoots/m^2 — scarce beds; IV stage — betwen 150 and 300 /299/ shoots/m^2 — very scarce beds; V stage — betwen 50 and 150 shoots/m^2 — half beds; VI stage — below 50 /49/ shoots /m^2 — isolated shoots). After this classification the beds from the study area may be categorized as: II stage beds at 5 m depth, II, III and IV stage beds at 10, 15 and 20 m respectively and V stage beds at 35 m.

RESULTS AND DISCUSSION

A total of 123 taxa (with no representatives of Cyanophyta and Diatomeae groups) were determined during the quantitative-qualitative studies of epiphytic flora on *Posidonia oceanica* leaves. Rhodophyta group are predominant with 87 taxa (70.7%) followed by Phaeophyta with 22 (17.9%) and Chlorophyta with 14 taxa (11.4%) (Fig. 2, Table 1).

Dick van der B e n (1971) carried out similar studies of epiphytic flora on *Posidonia oceanica* from the French Mediterranean coast (Banyuls and

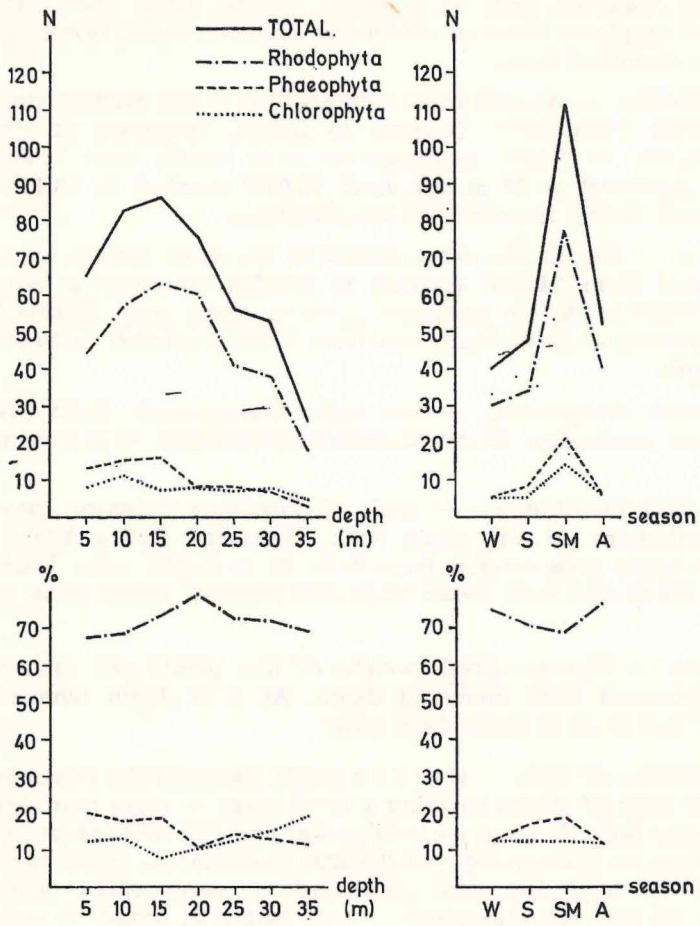

Fig. 2. — Numerical (N) and percentage (%) presence of epiphytic algae on *Posidonia oceanica* leaves at different depths (5 m, 10 m, 15 m, 20 m, 25 m, 30 m. 35 m) and in different seasons (W — winter, S — spring, SM — summer, A — autumn).

Villefranche) identifying a total of 90 taxa. Rhodophyta were represented by the largest number of taxa (60 or 66.7%) followed by Phaeophyta (22 or 24.4%) and Chlorophyta (8 or 8.9%).

Accordingly, about 27% more taxa were estabilished from almost the same depth ranges as in Dubrovnik area. In Rhodophyta group the difference is somewhat greater, about 31% and greatest in Chlorophyta group (about 43%). In Phaeophyta group the number of taxa is identical (22).

Panayotidis (1980) studying epiphytic flora on the leaves of Posidonia oceanica from the French Mediterranean coast (The Bay of Marseille,

and at the Port-Cros and Corsica islands) determined a total of 87 taxa (Rhodophyta 60 or 68.0%, Phaeophyta 19 or 21.8% and Chlorophyta 8 or 9.2%).

The total number of taxa is by about 30% lower than in the area of Dubrovnik. The difference is somewhat greater for Rhodophyta group, 31%, white it is greatest for Chlorophyta group, about 43%. The Phaeophyta group showed smaller difference (about 14%).

These differences are very likely due to the fact that Dubrovnik samplings were carried out at a considerably greater depth ranges, between 5 and 35 meters, and Panayotidis collected the samples from 6 to 13 m depths.

The analyses of quantitative-qualitative distribution of epiphytic flora on *Posidonia oceanica* leaves by depth showed the largest number of taxa at 15 m depths (86). Slightly lower number of taxa were found at 10 m (83) and by 12% less taxa (76) at 20 m. The number of taxa was by 24.5% lower at 5 m (65), by 35% lower at 25 m (56), by 38.5% lower at 30 m (53) and by 70% lower at 35 m (26) than at 15 m. Rhodophyta group taxa are predominant at all depths mainly followed by the taxa of Phaeophyta and Chlorophyta. The number of Rhodophyta varies from 63 (at 15 m) to 18 (at 35 m). Variations are greater in Phaeophyta group than in Rhodophyta group while in Chlorophyta variations are smaller.

The results obtained for 5 m depth may be compared to the results of Panayotidis (1979) who studied the epiphytic flora in Thessaloniki (Greece) at 4 m depth. This author established a total of 36 taxa of epiphytic algae (Rhodophyta 20 or 55.6%, Phaeophyta 11 or 30.5% and Chlorophyta 5 or 13.9%). It may be therefore stated that about 45% more taxa were recorded from Dubrovnik area than from the area studied by Panayotidis at the same depth. This difference was greater for Rhodophyta group (about 54%), somewhat lower for Chlorophyta (about 37%) and for Phaeophyta the smallest (about 15%).

However, comparing these results from 5 m depth with ours from the National Park KORNATI (Antolić, 1985) the differences are considerably smaller. Thus the epipytic flora on the leaves of *Posidonia oceanica* from 5 m in Dubrovnik area showed for about 9% more taxa than in Kornati area. The difference is greater for Phaeophyta (about 31%), considerably lower (about 13%) for Chlorophyta and quite insignificant for Rhodophyta (2%).

Results on seasonal distribution of epiphytic flora on *Posidonia oceanica* leaves may be taken only as preliminary since samplings were carried out mainly during summer months. These results show that the largest number of taxa (112) may be found during summer months whereas this number is by 54% (autumn, 52 taxons) to 64% (winter, 40 taxons) lower. If taken by groups the number of taxa varies most in Phaeophyta and least in Rhodophyta (Fig. 2, Table 1).

The analysis of qualitative distribution of epiphytic taxa by depth shows the forms that are continuously present at all depths (from 5 to 35 m). At the same time these taxa are the most frequent epiphytic forms of *Posidonia oceanica* leaves. Among these count the Rhodophyta taxa: *Goniotri-*

Table 1. Numerical (N) and percentage (%) presence of epiphytic algae on *Posidonia oceanica* leaves at different depths (5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 35 m) and in different seasons (W — winter, S — spring, SM — summer, A — autumn).

		DEPTH (m)							SEASON				
		5	10	15	20	25	30	35	W	S	SM	A	TOTAL
RHODOPHYTA	N	44	57	63	60	41	38	18	30	34	77	40	87
	%	67.7	68.7	73.3	79.0	73.2	71.7	69.2	75.0	70.8	68.8	76.9	70.7
PHAEOPHYTA	N	13	15	16	8	8	7	3	5	8	21	6	22
	%	20.0	18.1	18.6	10.5	14.3	13.2	11.6	12.5	16.7	18.7	11.5	17.9
CHLOROPHYTA	N	8	11	7	8	7	8	5	5	6	14	6	14
	%	12.3	13.2	8.1	10.5	12.5	15.1	19.2	12.5	12.5	12.5	11.5	11.4
TOTAL	N	65	83	86	76	56	53	26	40	48	112	52	123

chum alsidii, Fosliella farinosa, Fosliella lejolisii, Aglaothamnion furcellariae, Antithamnion cruciatum v. *profundum, Ceramium codii, Ceramium gracillimum* v. *byssoideum, Ceramium tenuissimum, Crouania attenuata, Wrangelia penicillata, Arachnophyllum confervaceum, Börgeseniella fruticulosa, Chondria tenuissima* and *Laurencia obtusa;* Phaeophyta taxa: *Sphacelaria cirrosa, Dictyota linearis* and *Myrionema orbiculare;* and Chlorophyta taxa: *Phaeophylla dendroides, Pringsheimiella scutata* and *Ulvella lens.*

In addition taxa which are very frequent but not present at all depths are also found. These are Rhodophyta taxa: *Acrochaetium daviesii, Fosliella farinosa* ssp. *solmsiana, Chylocladia verticillata, Lomentaria chylocladiella, Aglaothamnion tenuissimum, Griffithsia barbata, Spermothamnion johanis, Spermothamnion repens, Spyridia filamentosa, Dasya baillouviana, Halodictyon mirabile, Herposiphonia tenella* f. *secunda, Laurencia pinnatifida, Polysiphonia elongata, Lejolisia mediterranea, Monosporus pedicellatus* and *Seirospora interrupta;* Phaeophyta taxa: *Sphacelaria fusca, Dictyota dichotoma* and *Castagnea mediterranea;* and of Chlorophya only the species *Entocladia viridis.*

One of the characteristics of qualitaive composition of epiphytic flora are the forms which rarely (on only one depth) occur as epiphytes. These are Rhodophyta taxa: *Erythrocladia subintegra, Corallina granifera, Acrosymphyton purpuriferum, Plocamium cartilagineum, Falkenbergia rufolanosa, Aglaothamnion caudatum, Antithamnion heterocladum, Callithamniella tingitana, Ceramium ciliatum, Ceramium echionotum, Griffithsia phyllamphora, Spermothamnion repens* v. *flagelliferum, Dasya punicea, Brogniartella byssoides, Chondria dasyphylla, Wurdemannia miniata, Polysiphonia sertularioides, Rhodymenia ardissonei* and *Composothamnion thuyoides;* Phaeophyta taxa: *Giffordia dalmatica, Ectocarpus confervoides* v. *siliculosus, Myriactula rivulariae, Nereia filiformis* and *Dictyopteris membranacea;* and *Chlorophyta* taxa: *Chaetomorpha linum, Chaetomorpha aerea, Cladophora dalmatica, Pseudochlorodesmis furcellata* and *Derbesia tenuissima.*

The rest of forms of epiphytic algae on *Posidonia oceanica* leaves occur discontinuously and with varying frequency.

Seasonal qualitative composition showed the taxa present all year round and taxa which occur in only one season or in more seasons. The largest number of taxa (60) occurs in only one season and the forms present in epiphytic flora all year round (32) come next.

CONCLUSIONS

A total of 123 taxa (with no representatives of Cyanophyta and Diatomeae groups) was established during the studies of epiphytic flora on the leaves of *Posidonia oceanica* collected from 7 transects in the vicinty of Dubrovnik. The Rhodophyta group was most numerous with 87 taxa (70.7%) followed by the Phaeophyta with 22 taxa (17.9%) and Chlorophyta with 14 taxa (11.4%).

The analysis of quantitative-qualitative distribution of epiphytic flora by depth showed the greatest number of taxa (86) at 15 m depth. Going deeper

their number is more reduced than going towards the surface. Rhodophyta group is predominant at all depths followed mainly by Phaeophyta and Chlorophyta. Phaeophyta showed greatest variations in the number of taxa at all depths, Rhodophyta showed somewhat less variations and Chlorophyta the least.

Even though the material was not collected by the same intensity in all the seasons, but most intensively in summer, a preliminary account of seasonal distribution of epiphytic flora may be given. Highest number of taxa was recorded in summer and smallest in winter. Rhodophyta taxa are absolutely most numerous in all the seasons, followed by Phaepohyta and Chlorophyta taxa. Greatest seasonal variations in the number of taxa were recorded in Phaeophyta group and smallest variations in Rhodophyta group.

Forms that occur continuously at all depths were established as well as very frequent taxa not occurring at all depths, very rare taxa and taxa with discontinuous occurrence.

Seasonal distribution showed the taxa present in epiphytic flora all year round and taxa present in single or more seasons.

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U ovom radu iznose se po prvi puta podaci o kvalitativno-kvantitativnoj, te dubinskoj i sezonskoj distribuciji epifitske flore na lišću *Posidonia oceanica* na nekom od lokaliteta istočne obale Jadranskog mora.

Uzorkovanja su izvršena na 7 transekata na području Dubrovnika (na otocima Koločep, Daksa i Lokrum te na obali kod rtova Bat, Petka i na Lapadu) u nejednakim vremenskim razmacima između 1977. i 1983. godine. Materijal je sakupljen metodom direktnog (autonomnim roniocima sa površine 50 cm × 50 cm) i indirektnog (dredžom) uzrokovanja na dubinama između 5 i 35 m.

Ukupno su određena 123 oblika (bez predstavnika skupina Cyanophyta i Diatomeae). Najbrojniji su predstavnici skupine Rhodophyta sa 87 oblika (70,7%), slijede predstavnici skupine Phaeophyta sa 22 oblika (17,9%), te predstavnici skupine Chlorophyta sa 14 oblika (11,4%).

Najveći broj taksona (86) nađen je na 15 m dubine. Njihov broj opada slabije prema manjim nego većim dubinama. Na svim dubinama dominiraju oblici skupine Rhodophyta, a slijede ih uglavnom oni iz skupina Phaeophyta i Chlorophyta. Najveća kolebanja broja taksona na pojedinim dubinama utvrđena su u skupini Phaeophyta, nešto manja u skupini Rhodophyta, a najmanja u skupini Chlorophyta.

Preliminarni pregled sezonske distribucije epifitske flore izdvaja ljeto sa najvećim, a zimu sa najmanjim brojem utvrđenih taksona. U svim sezonama apsolutno dominiraju oblici iz skupine Rhodophyta, a uglavnom slijede oblici iz skupina Phaeophyta i Chlorophyta. Najveća sezonska kolebanja broja oblika nađena su u skupini Phaeophyta, a najmanja u skupini Rhodophyta.

Utvrđeni su oblici koji se javljaju kontinuirano na svim dubinama, zatim oblici koji su veoma česti ali se ne nalaze na svim dubinama, zatim oblici koji su veoma rijetki, te oblici koji se javljaju diskontinuirano.

U sezonskoj distribuciji utvrđeni su oblici koji su u epifitskoj flori prisutni tokom čitave godine, te oblici koji se javljaju u jednoj ili više sezona.

Table 2. List of determined epiphytic algae on *Posidonia oceanica* leaves, and their depth (5 m, 10 m, 15 m, 20 m, 25 m, 30 m, 35 m) and seasonal (W — winter, S — spring, SM — summer, A — autumn) distribution.

	DEPTH (m)							SEASON			
	5	10	15	20	25	30	35	W	S	SM	A
RHODOPHYTA											
Chroodactylon ornatum (C. Ag.) Drew et Ross	+		+	+						+	
Goniotrichum alsidii (Zanard.) Howe	+	+	+	+	+	+	+	+	+	+	+
Erythrocladia subintegra Rosenv.				+						+	
Acrochaetium daviesii (Dillw.) Näg.	+	+	+	+	+	+		+	+	+	+
Acrochaetium virgatulum (Harv.) Born.			+	+						+	
Corallina granifera Ellis et Sol.						+				+	
Dermatolithon cystoseirae (Hauck) H. Huvé	+	+	+							+	
Fosliella farinosa (Lamour.) Howe	+	+	+	+	+	+	+	+	+	+	+
Fosliella farinosa var. solmsiana (Falk.) Foslie		+	+	+	+	+	+			+	
Fosliella lejolisii (Rosanoff) Howe	+	+	+	+	+	+	+	+	+	+	+
Jania rubens (L.) Lamour.	+	+									+
Acrosymphyton purpuriferum (J. Ag.) Sjöst.			+							+	
Plocamium cartilagineum (L.) Dixon				+						+	
Rhodophyllis divaricata (Stackh.) Papenff.		+	+					+		+	
Caulacanthus ustulatus (Mert.) Kütz.	+	+	+							+	+
Champia parvula (C. Ag.) Harv.	+	+	+	+				+	+	+	+
Chylocladia verticillata (Lightf.) Bliding	+	+	+	+	+	+		+	+	+	+
Lomentaria chylocladiella Funk	+	+	+	+	+	+		+	+	+	+
Falkenbergia rufolanosa (Harv.) Schmitz.			+							+	
Rhodymenia ardissonei J. Feldm.		+									+
Aglaothamnion caudatum (J. Ag.) G. Feldm.			+							+	
Aglaothamnion furcellariae (J. Ag.) G. Feldm.	+	+	+	+	+	+	+	+	+	+	+
Aglaothamnion tenuissimum (Bonnem.) G. Feldm.		+	+	+	+	+	+	+		+	
Antithamnion cruciatum (C. Ag.) Näg.	+	+		+				+			+
Antithamnion cruciatem var. profundum G. Feldm.	+	+	+	+	+	+	+	+	+	+	+
Antithamnion heterocladum Funk			+						+		
Antithamnion tenuissimum (Hauck) Schiff.			+	+		+				+	
Callithamniella tingitana (Schousb. et Bornet) G. Feldm.				+						+	
Callithamnion corymbosum (Smith) Lyngb.	+	+	+	+					+	+	+
Callithamnion granulatum (Ducl.) C. Ag.		+						+			
Ceramium bertholdii Funk	+	+		+				+		+	
Ceramium ciliatum (Ell.) Ducl.				+						+	
Ceramium codii (Rich.) G. Feldm.	+	+	+	+	+	+	+	+	+	+	+

Ceramium diaphanum (Light.) Roth	+			+						+		
Ceramium diaphanum var. lophophorum G. Feldm.		+	+	+						+		
Ceramium diaphanum var. strictum (Kütz.) G. Feldm.	+		+						+	+		
Ceramium echionotum J. Aa.					+					+		
Ceramium gracillimum var. byssoideum (Harv.) G. Feldm.	+	+	+	+	+	+	+	+	+	+	+	
Ceramium tenerrimum (Mart.) Okamura	+	+							+	+		
Ceramium tenuissimum (Lyngb.) J. Ag.	+	+	+	+	+	+	+		+	+	+	
Compsothamnion thuyoides (Smith) Schmitz					+					+		
Crouania attenuata (Bonnem.) J. Ag.	+	+	+	+	+	+	+	+	+	+	+	
Griffithsia barbata (Smith) C. Ag.	+	+	+	+	+	+				+	+	
Griffithsia phyllamphora J. Ag.	+									+		
Griffithsia schousboei Mont.			+	+	+	+				+		
Lejolisia mediterranea Bornet		+	+	+	+	+			+	+		
Monosporus pedicellatus (Smith) Sol.	+	+	+	+	+			+	+	+	+	
Monosporus pedicellatus var. tenuis G. Feldm.	+		+	+		+				+		
Platythamnion plumula var. crispum (Ducl.) Hauck		+	+	+					+	+		
Pleonosporium borreri (Smith) Näg.			+	+					+	+		
Ptilothamnion pluma (Dillw.) Thur.		+	+							+		
Seirospora apiculata (Menegh.) G. Feldm.		+		+		+				+		
Seirospora interrupta (Smith) Schmitz	+	+	+	+	+	+				+		
Seirospora sphaerospora J. Feldm..			+	+	+					+		
Spermothamnion flabellatum Bornet	+	+	+	+				+	+	+	+	
Spermothamnion johanis G. Feldm.		+	+	+	+	+	+	+	+	+	+	
Spermothamnion repens (Dillw.) Rosenv.	+	+	+	+	+	+		+	+	+	+	
Spermothamnion repens var. flagelliferum (De Not.) G. Feldm.			+						+			
Spyridia filamentosa (Wulf.) Harv.	+	+	+	+	+	+		+	+	+	+	
Wrangelia penicillata C. Ag.	+	+	+	+	+	+	+			+	+	
Dasya baillouviana (Gmel.) Mont.		+	+	+	+	+				+	+	
Dasya hutchinsiae Harv.	+	+	+	+						+	+	
Dasya ocellata (Grat.) Harv.	+	+	+	+						+		
Dasya punicea Menegh.			+					+				
Dasyopsis plana (C. Ag.) Zanard.				+	+					+	+	
Dasyopsis spinella (C. Ag.) Zanard.			+	+	+					+	+	
Apoglossum ruscifolium (Turn.) J. A.				+	+					+		
Arachnophyllum confervaceum (Meneg.) Zanard.	+	+	+	+	+	+	+			+	+	
Hypoglossum woodwardii Kütz.		+	+	+		+			+	+		
Hypoglossum woodwardii f. profundum Erceg.		+	+			+				+		
Nitophyllum punctatum (Stack.) Grev.		+	+					+				
Börgeseniella fruticulosa (Wulf.) Kylin	+	+	+	+	+	+	+	+	+	+	+	
Brogniartella byssoides (Good. et Wood.) Sshmitz					+					+		
Chondria dasyphylla (Wood.) C. Ag.					+						+	
Chondria tenuissima (Good. et Wood.) C. Ag.	+	+	+	+	+	+	+	+	+	+	+	

Table 2, continued

	DEPTH (m)							SEASON			
	5	10	15	20	25	30	35	W	S	SM	A
Dipterosiphonia rigens (Schousb.) Falk.		+		+					+	+	
Halodictyon mirabile Zanard.	+	+	+	+	+	+		+	+	+	+
Herposiphonia tenella (C. Ag.) Ambr.		+	+	+						+	
Herposiphonia tenella f. secunda (C. Ag.) Holl.	+	+	+	+	+	+		+	+	+	+
Laurencia obtusa (Hunds.) Lamour.	+	+	+	+	+	+	+	+	+	+	+
Laurencia pinnatifida (Gmel.) Lamour.	+	+	+	+	+	+		+	+	+	+
Polysiphonia elongata (Huds.) Spreng.		+	+	+	+	+				+	
Polysiphonia opaca (C. Ag.) Morr. et De Not.	+		+							+	+
Polysiphonia sertularioides (Grat.) J. Ag.	+									+	
Polysiphonia subulifera (C. Ag.) Harv.		+								+	
Polysiphonia sp.	+	+	+	+	+	+	+	+	+	+	+
Wurdemannia miniata (Drap.) J. Feldm. et Hamel		+									+
PHAEOPHYTA											
Ectocarpus confervoides var. adriaticus (Erceg.) Giacc.	+	+	+							+	
Ectocarpus confervoides var. siliculosus (Dillw.) Kjellm.			+							+	
Ectocarpus sp.		+				+			+	+	
Feldmannia irregularis (Kütz.) Hamel	+	+								+	
Giffordia dalmatica (Erceg.) Giaccone		+	+							+	
Giraudia sphacelarioides Derb. et Sol.	+	+	+	+					+	+	
Sphacelaria cirrosa (Roth) C. Ag.	+	+	+	+	+	+	+	+	+	+	+
Sphacelaria fusca (Huds.) C. Ag.	+	+	+	+	+	+				+	+
Sphacelaria plumula Zanard.		+	+					+		+	
Halopteris filicina (Grat.) Kütz.		+			+					+	+
Dictyopteris membranacea (Stackh.) Batters			+							+	
Dictyota dichotoma (Huds.) Lamour.	+	+	+	+	+			+	+	+	+
Dictyota linearis (C. Ag.) Grev.	+	+	+	+	+	+	+	+	+	+	+
Padina pavonica (L.) Thivy	+		+							+	
Castagnea mediterranea (Kütz.) Hauck	+	+	+	+	+	+			+	+	
Myriactula rivulariae (Suhr.) Feldm.		+							+		
Myriactula stellulata (Griff.) Feldm.	+	+	+			+				+	
Myrionema orbiculare J. Ag.	+	+	+	+	+	+	+	+	+	+	+
Myrionema strangulans Grev.	+		+							+	
Stilophora rhizodes (Turn.) J. Ag.			+	+						+	

Nereia filiformis (J. Ag.) Zanard.					+					+		
Cystoseira sp.	+	+								+		
CHLOROPHYTA												
Ulothrix subflaccida Wille	+	+		+		+			+	+		
Bulbocoleon piliferum Pringsh.		+				+				+	+	
Entocladia viridis Reinke		+	+	+	+	+				+		
Phaeophylla dendroides (Crouan) Batt.	+	+	+	+	+	+	+	+	+	+	+	
Pringsheimiella scutata (Reinke) March.	+	+	+	+	+	+	+	+	+	+	+	
Ulvella lens Crouan	+	+	+	+	+	+	+	+	+	+	+	
Chaetomorpha aerea (Dillw.) Kütz.	+									+		
Chaetomorpha linum (Müll.) Kütz.	+									+		
Cladophora dalmatica Kütz.		+								+		
Cladophora sp.	+	+	+	+	+	+	+	+	+	+	+	
Rhizoclonium riparium (Roth) Harv.	+	+	+	+	+	+	+	+	+	+	+	
Pseudochlorodesmis furcellata (Zanard.) Börg.			+							+		
Derbesia tenuissima (Morr. et de Not.) Crouan		+								+		
Bryopsis hypnoides Lamour.		+		+	+					+