

E. GIOVANNETTI, M. MONTEFALCONE, C.N. BIANCHI, C. MORRI, G. ALBERTELLI

DipTeRis, Dipartimento per lo Studio del Territorio e delle sue Risorse
Università di Genova, Corso Europa, 26-16132 Genova, Italia

STRUCTURAL VARIABILITY OF THE EPIPHYTIC COMMUNITY IN A *POSIDONIA OCEANICA* MEADOW (LIGURIAN SEA, NW MEDITERRANEAN)

Abstract

Several factors influence the epiphytic assemblage of *Posidonia oceanica* (L.) Delile (Monocotyledones, Posidoniaceae) leaves. The aim of this study was to investigate the epiphytic community structure in the *P. oceanica* meadow of Prelo cove (Ligurian Sea, NW Mediterranean) along a yearly cycle and a depth gradient. Sampling was carried out monthly from September 2003 to August 2004 at three different depths: 4, 9 and 14 m. Each month, 10 randomly selected *P. oceanica* shoots were collected by SCUBA diving in each station. Percentage cover of the most representative taxa was estimated and subjected to multivariate analysis in order to detect seasonal changes in the epiphytic assemblage along the bathymetric gradient. In all stations, the epiphytic assemblage exhibited cyclic variability, and two major phases were distinguished: an autumnal one dominated by *Hydrolithon-Pneophyllum* spp, and a spring-early summer one in which the algae were flanked by *Electra posidoniae*. A poorer but more various assemblage, with the appearance of the erect hydrozoans and bryozoans, was found in the deep station.

Key-words: *Posidonia oceanica*, epiphytic assemblage, depth gradient, seasonal cycle, Mediterranean Sea.

Introduction

The most important seagrass in the Mediterranean Sea is *Posidonia oceanica* (L.) Delile, an endemic species that forms wide meadows. This plant hosts on its leaves and rhizomes a characteristic epiphytic community. Several factors influence the epiphytic assemblage, such as the cyclic phenology of the host plant, hydrodynamic forces, light intensity and anthropogenic disturbances (Mazzella *et al.*, 1989; Dalla Via *et al.*, 1998; Piazzì *et al.*, 2004; Montefalcone *et al.*, 2006).

In this work the epiphytic community structure of *P. oceanica* leaves was investigated in a yearly cycle and along a depth gradient in order to describe its spatial and temporal variation.

Materials and methods

The study was carried out in the *Posidonia oceanica* meadow of Prelo cove (Ligurian Sea, NW Mediterranean). Along a depth transect (directed perpendicularly to the shoreline, 270°N), three stations were identified: 4 m (44°20'12" N, 009°13'33" E), 9 m (44°20'11" N, 009°13'36" E) and 14 m (44°20'11" N, 009°13'39" E), where 10 randomly selected *P. oceanica* shoots were collected by SCUBA diving monthly, from September 2003 to August 2004 (December data are missing). In the laboratory both sides of each *P. oceanica* leaf blade were analysed using a binocular stereomicroscope to estimate the percentage cover of the following taxa: *Hydrolithon-Pneophyllum* spp., *Myrionema orbiculare*, *Giraudia sphacelarioides*, *Electra posidoniae*, *Aetea truncata*, *Fenestrulina johannae*, *Plumularia obliqua*, *Sertularia perpusilla*. All the other organisms were grouped in: Other

Bryozoans, Serpulids, Other Animals and Other Algae. The cover data per shoot were analysed with multivariate techniques (ANOSIM, MDS, SIMPER) in order to detect spatial and temporal variability of the epiphytic community structure.

Results

Two-way crossed analysis ANOSIM test revealed clear differences in the epiphytic community structure among depths ($R = 0.456$; $P = 0.1\%$) and months ($R = 0.692$; $P = 0.1\%$); the month factor determined the major dissimilarity. The MDS ordination showed, at three depths, a cyclic seasonal variability of the epiphytic community structure (Fig. 1). The vicinity of the ending point (8= August 2004) to the starting point (9= September 2003) was greater at 14 m than at the shallow and the intermediate stations.

Moreover the MDS ordination showed, at all stations, differences in dispersion (variability) of the epiphytic assemblage in each month, with the greatest dispersion observed in the autumn-winter months.

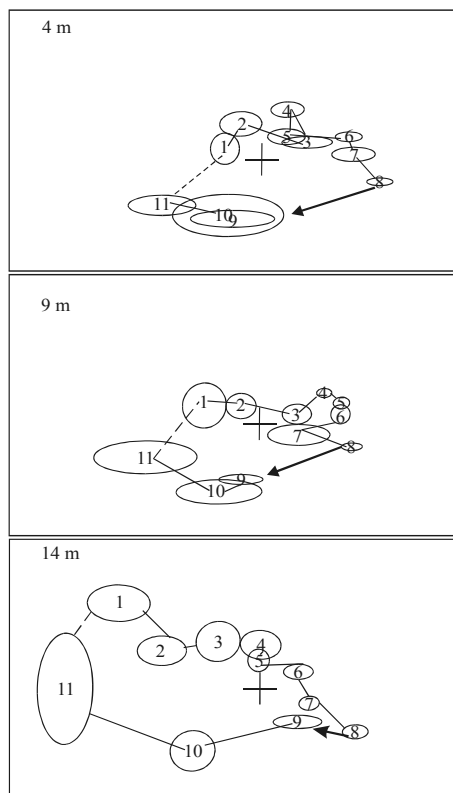


Fig. 1 - MDS ordination comparing the epiphytic community structure at the three stations (4 m, 9 m, 14 m) along a yearly cycle. The three depths have been plotted separately (Stress = 0.14). The numbers indicate the months: from September 2003 (9) to August 2004 (8). December data are missing (dashed lines). The centre of the ellipses corresponds to monthly means, ellipses depict 95 % confidence intervals. Arrows indicate the tendency to close the cycle. The cross indicates the centre of the axes.

SIMPER, applying the usual cut-off of a cumulative % similarity of 80 %, identified a total of 8 taxa as important in characterizing the epiphytic community structure (Fig. 2). The remaining 4 taxa (namely *Myrionema orbiculare*, *Giraudia sphacelarioides*, *Fenestrulina johannae* and Other Algae) played a non-significant role.

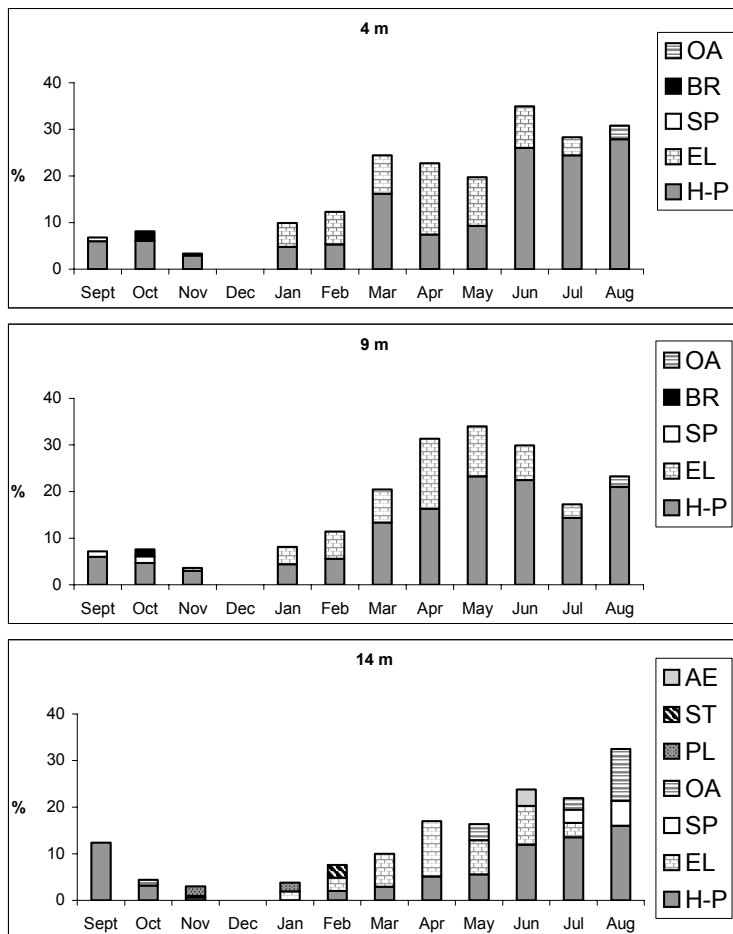


Fig. 2 - The mean percentage cover of the major epiphytes, determined through SIMPER, along a yearly cycle at three depths (4 m, 9 m, 14 m). H-P = *Hydrolithon-Pneophyllum* spp, EL = *Electra posidoniae*, SP = Serpulids, BR = Other Bryozoans, OA = Other Animals, PL = *Plumularia obliqua*, ST = *Sertularia perpusilla*, AE = *Aetea truncata*.

Hydrolithon-Pneophyllum spp., the main epiphytes at all stations, were present all year round. Apart the autumn months, these epiphytes were flanked by *Electra posidoniae* that, sometimes, exhibited the major percentage cover. At the deep station a poorer but more various community was found than at the shallow and the intermediate stations, with also the appearance of *Aetea truncata*, *Sertularia perpusilla*, and *Plumularia obliqua*.

Discussion

The epiphytic community structure was mainly influenced by seasonal variability. The great environmental variability at the two shallower stations was reflected by the more open seasonal cycles compared with the one at the deep station, implying in turn a colonisation delay between shallow and deep meadow (Mazzella *et al.*, 1986). Possible relationships with size and ages of leaves remain to be investigated.

The depth factor as compared to the month factor had a lower influence on the epiphytic assemblage, because of the small bathymetric gap among the stations. The appearance of erect hydrozoans and bryozoans at the deep station should be correlated to the lower water movement there as compared to the shallower stations (Piraino and Morri, 1990; Balduzzi *et al.*, 1991) and to the lesser development of *Hydrolithon-Pneophyllum* spp (Giovannetti, 2004), leaving greater space to other epiphytes.

References

- BALDUZZI A., BARBIERI M., GRISTINA M. (1991) – Morphology and life strategies of *Aetea* (Bryozoa: Cheilostomata) living on some western mediterranean *Posidonia oceanica* meadows. *Bull. Soc. Sc. Nat.*, **1**: 1-12.
- DALLA VIA J., STURMBAUER C., SCHÖNWEGER G., SÖTZ E., MATHEKOWITSCH S., STIFTER M., RIEGER R. (1998) – Light gradients and meadow structure in *Posidonia oceanica*: ecomorphological and functional correlates. *Mar. Ecol. Prog. Ser.*, **163**: 267-278.
- GIOVANNETTI E. (2004) – *Variazioni stagionali della comunità epifita e dell'attività di grazing nella prateria di Posidonia oceanica (L.) Delile della baia di Prelo (Rapallo, Ge)*. Tesi di laurea in Scienze Ambientali, Università degli studi di Genova: 165 pp.
- MAZZELLA L., SCIPIONE M.B., GAMBI M.C., FRESI E., BUIA M.C., RUSSO G.F., DE MAIO R., LORENTI M., RANDO A. (1986) - *Le praterie sommerse del Mediterraneo*. Pubbl. Stazione Zoologica, Napoli: 59 pp.
- MAZZELLA L., SCIPIONE M.B., BUIA M.C. (1989) – Spatio-temporal distribution of algal and animal communities in a *Posidonia oceanica* meadow. *P.S.Z.N.I: Mar. Ecol.*, **10** (2): 107-129.
- MONTEFALCONE M., GIOVANNETTI E., BIANCHI C.N., MORRI C., ALBERTELLI G. (2006) – Variazione stagionale del ricoprimento epifita sulle due facce delle lamine fogliari di *Posidonia oceanica*. *Biol. Mar. Med.*, **13** (1): 606-609.
- PIAZZI L., BALATA D., CINELLI F., BENEDETTI-CECCHI L. (2004) – Patterns of spatial variability in epiphytes of *Posidonia oceanica*. Differences between a disturbed and two reference locations. *Aquat. Bot.*, **79**: 345-356.
- PIRAINO S., MORRI C. (1990) – Zonation and ecology of epiphytic hydroids in a Mediterranean coastal lagoon: the Stagnone of Marsala (North-West Sicily). *P.Z.S.N.I: Mar. Ecol.*, **11** (1): 43-60.