

BENTHOS OF THE *CAULERPA TAXIFOLIA* SETTLEMENT AT MALINSKA (CROATIA, ADRIATIC SEA)

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Abstract

Diversity of macrobenthos in the *Caulerpa taxifolia* settlement at Malinska was analyzed. In general, flora and fauna are alike to those in the western Mediterranean.

Key words: zoobenthos, phytobenthos, Adriatic Sea, *Caulerpa taxifolia*

In the Malinska area (Krk Island, north Adriatic Sea) the invasive green alga *Caulerpa taxifolia* was firstly noted in November 1994. In 1996 the harbour settlement was eradicated (1) and this site remained deprived of alga till now. But a few *Caulerpa* bushes at nearby locations which were not treated gave rise to an actual extension of alga in the area of about 13 250 m². Although tropical by its origin, *Caulerpa* has survived low winter temperatures of only 9°C and by now it is patchily distributed at the Malinska breakwater, the town beach and at the Haludovo hotel complex. The settlement cartography was elaborated by Zavodnik et al. (2).

The aim of present study was to get an insight into the mobile and sediment living benthos covered by *Caulerpa* carpet. The area was surveyed monthly from December 1997 till November 1999. Data were compiled by divers' visual census and manual collections along transects crossing the algal carpet, and by processing the sediment taken from 25 x 25 cm plots.

At sites noted above *Caulerpa* was mostly anchored by cauloids in the sandy sediment at a 6-8 m depth. Only a few fronds were attached to a large litter and pebbles which supported other seaweeds too. Sparse *Zostera noltii* and *Cymodocea nodosa* meadows also appeared at some sites. In the upper sediment layer the seagrass roots and *Caulerpa* cauloids were densely intermingled. A preliminary note on associated seaweeds was provided previously (2). Red algae *Laurencia obtusa*, *Polysiphonia* spp., *Rhytiphloea tinctoria* and *Vidalia volubilis* were common in all seasons. Brown algae were represented by *Dictyopterus polypoides*, *Dictyota dichotoma*, two *Halopteris* species, and others. Among green algae, *Cladophora albida*, *C. prolifera* and *Ulva rigida* were outstanding. On *Caulerpa* fronds 26 epiphytic species were noted.

Information on macrofauna noted by divers (i.e. visual census) and on that extracted from sediment batches was rather diverse (Fig.1). Total 114 invertebrate species were noted. Diversities of high taxa were similar to those noted in the western Mediterranean (3, 4), except of molluscs which at Malinska were more diverse. The presence index of 40% or more was established only in the following species: *Musculus costulatus*, *Anomia* sp., *Lucinella divaricata*, *Parvicardium ovale*, *Plagiocardium papillosum*, *Gouldia minima*, *Pitar rudis*, *Corbula gibba*, *Rissoa similis*, *Euspira nitida*, *Nassarius incrassatus*, *Eunice oerstedii*, *Lumbrineris fragilis*, *Scoloplos armiger* and *Ophiura albida*. Dominant taxocoenes of the sediment living meiofauna were Copepoda (62 %) and Nematoda (21 %) (A. Travizi, personal communication). A detailed analysis on the matter will be presented in another paper.

Acknowledgement.

The research was supported by the Ministry for Science and Technology of the Republic of Croatia (Project No. 00981302).

References

1. Zavodnik N., Jaklin A. and Labura Z., 1997. Pojava tropske alge *Caulerpa taxifolia* u Rijeckom zaljevu. In: Prirodoslovna istraživanja Rijeckog zaljeva. (Arko-Pijevac M., Kovacic M. and Crnkovic D. (eds.), Prirodoslovni muzej Rijeka, pp. 717-722.
2. Zavodnik N., Travizi A., Jaklin A. and Labura Z., 1998. *Caulerpa taxifolia* (Chlorophyta) in the North Adriatic Sea at Malinska (Krk Island, Croatia). In: Third International Workshop on *Caulerpa taxifolia*. (Boudouresque C.-F., Gravez V., Meinesz A. and Palluy F. (eds)), GIS Posidonie Publ., Marseille, pp. 175-184.
3. Bellan-Santini D., 1995. Faune d'invertébrés du peuplement à *Caulerpa taxifolia*. Données préliminaires pour les côtes de Provence (Méditerranée nord-occidentale). *Biol. Mar. Médit.*, 2(2): 635-643.
4. Bellan-Santini D., Arnaud P.M., Bellan G. and Verlaque M., 1996. The influence of the introduced tropical alga *Caulerpa taxifolia*, on the biodiversity of the Mediterranean marine biota. *J. mar.biolo. Ass.U.K.*, 76: 235-237.
5. Harmelin-Vivien M., Harmelin J.-G. and Francour P., 1996. A 3-year study of the littoral fish fauna of sites colonized by *Caulerpa taxifolia* in the N.W. Mediterranean (Menton, France). In: Second International Workshop on *Caulerpa taxifolia*. (Ribera M.A., Ballesteros E., Boudouresque C.-F., Gómez A. and Gravez V. (eds)), Universitat de Barcelona, Barcelona, pp. 391-397.
6. Relini G., Relini M. and Torchia G., 1998. Fish and epiphytic fauna on *Caulerpa taxifolia* and *Cymodocea nodosa* at Imperia (Ligurian sea). In: Third International Workshop on *Caulerpa taxifolia*. (Boudouresque C.-F., Gravez V., Meinesz A. and Palluy F. (eds)), GIS Posidonie Publ., Marseille, pp. 185-195.

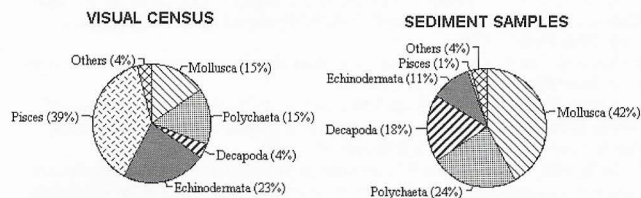


Figure 1. Species diversity of macrofauna in the *Caulerpa taxifolia* community at Malinska.

Only 12 fish species were noted at our *Caulerpa* patches. Consequently, the ichthyofauna of studied sites was poor in comparison to fish populations of compact and well distributed *Caulerpa* communities in the western Mediterranean (5, 6). Though, the stay of *Hippocampus ramulosus* on *Caulerpa* fronds, and browsing on *Caulerpa* of *Sarpa salpa* should be noted. Regrettably, biological data on the sites of research before the *Caulerpa* invasion are lacking; therefore, evaluation of eventual alterations of benthos is not possible.