THE GENUS *CAULERPA* (CAULERPALES, CHLOROPHYTA) IN ADRIATIC SEA

Ante Span, Boris Antolic [1]* and Ante Zuljevic [2]
Institute of Oceanography and Fisheries
Set. I. Mestrovica 63, 21000 Split, Croatia

Abstract

In this paper geographical locations of *Caulerpa* genus in Adriatic Sea are described. So far, the alga *C. prolifera* has been found on three locations: Gargano peninsula (Italy), islands Tremiti (Italy) and around town Rovinj (Croatia). In our recent research, the alga was found on three new grounds: Rijeka Dubrovacka bay near Dubrovnik, Skrivena Luka bay (island Lastovo) and Starigrad bay (island Hvar). The first records for *C. taxifolia* in Adriatic Sea are also presented. The alga was found on three locations: Starigrad bay (island Hvar), Malinska (island Krk) and island Dolin. Characteristics of substratum, bathymetric amplitude and predominate species on the new locations of *C. prolifera* and *C. taxifolia* colonies are described.

Key-words: algae, Adriatic Sea

Introduction

The genus *Caulerpa* comprises about 72 (1) species living in temperate and especially tropical seas. There are eight taxa, six species and two varietas, of the genus living in the Mediterranean (2). Two species of *Caulerpa* are indigenous to the Mediterranean: *C. prolifera* and *C. ollivieri*. Three *Caulerpa* species are probabely lessepsian immigrants: *C. scalpelliformis*, *C. mexicana* and *C. racemosa*. According with this hypothesis they have entered the Mediterranean from Red Sea through the Suez Canal (3, 4).

The alga *C. scalpelliformis* was observed for the first time in the Mediterranean offshore Beirut (Lebanon) in 1930. It was found in Palestine and in Syria where it forms dense populations (5).

The first record for Red Sea species *C. mexicana* was in Palestine, 1941. It was also spotted on several locations in Syria (3, 5).

Most common tropical species *C. racemosa* was recorded for the first time in the Mediterranean in 1926 offshore Tunis. After that date it was spotted on many locations (Turkey, Syria, Lebanon, Israel, Egypt, Tunis) (3, 5). Rayss (6), Rayss *et al.* (7) and Di Martino and Giaccone. (8) propose that *C. racemosa* and *C.mexicana* might be a relic of the Tethys. If that was the case the both species would not be a lessepsian immigrant.

Tropical species *C. taxifolia* has colonised Mediterranean since 1984. The alga was found offshore Monaco. From that time on, it was spotted on many locations on the French, Spanish, Italian and Croatian coast (4, 9). It seams that the transport of the thallus cuttings in the anchor casings of pleasure craft or fishing nets is the dispersal mechanism along great distances through the Mediterranean (10). Sexual reproduction has not been observed so far. It colonises all types of substrate: rock, sand, mud or seagrass meadows. *C. taxifolia* forms continuous meadows to 20 - 30 meters depth, having a patchy distribution at deeper areas. It can survive up to a depth of 90 m in the clearer waters (4, 11).

The alga *C. ollivieri* was found mixed with *C. prolifera* at Balearic island, French and Levant coast. Taxonomy of this species is dubious. It is possible that *C. ollivieri* is a subspecies or form of *C. prolifera* (5).

Indigenous Mediterranean species *C. prolifera* is widely distributed offshore Mediterranean (12, 13). The alga *C. prolifera* in Adriatic Sea has been found on three locations: Gargano peninsula (Italy), islands Tremiti (Italy) and around town Rovinj (Croatia) (16).

This paper presents data on three new localities of genus *caulerpa* (*C. prolifera* and *C. taxifolia*) on the Croatian east Adriatic coast.

Materials and methods

The investigations were performed by SCUBA diving at 5 stations between 1977 and 1996: in the Dubrovnik area - Rijeka dubrovacka bay (42°40'20"N, 18°5'54"), in the Lastovo island area - Skrivena luka bay (42°44'3"N, 16°53'22"E), in the Hvar island area - Starigrad bay (43°10'54"N, 16°35'E), in the Dolin island area (44°44'16"N, 16°53'32"E) and in the Krk island area - port of Malinska (45°7'30"N, 14°31'56"E).

Material was collected along depth transects and conserved in 4% formaldehyd solution.

Results and discussion

The alga *C. prolifera* was found at three new locations on Croatian coast of Adriatic sea: Rijeka Dubrovacka bay near Dubrovnik, Skrivena Luka bay (island Lastovo), Starigrad bay (island Hvar) (Fig. 1).

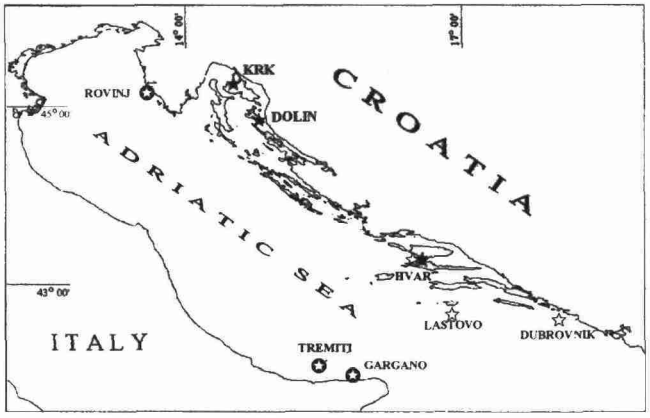

Figure 1 : Distribution of genus *Caulerpa* in Adriatic Sea. *C. taxifolia* ★; *C. prolifera* ☆ our records; *C. prolifera* ✪ previous records (Giaccone, 1978).

The first record was in Rijeka Dubrovacka bay in 1977 (Fig. 1). According to the citizens of Rijeka Dubrovacka, the alga was brought by an Austrian aquarist about 1930. Today, the alga individually grows on sandy-muddy substrate between 8 and 10 metres depth. The algae species (*Rytiphloea tinctoria, Gracilaria verrucosa* and *Cladophora prolifera*) common for that type of substrate are presented (Table 1).

The second record of *C. prolifera* on east side of Adriatic Sea was in 1981 in Skrivena Luka bay, island Lastovo (Fig. 1). It grows in a quiet bay forming a small patches on sandy and sandy-muddy substrate between 0.5 and 5 metres depth. The predominate plant species living with algae are *Padina pavonica* and *Rytiphloea tinctoria* and seagrass *Cymodocea nodosa* (Table 1).

The last record was in Starigrad bay (island Hvar) in 1995 (Fig. 1). *C. prolifera* forms a small, 4 m in diameter, meadow inside a large *C. taxifolia* colony. The community is formed by *Cymodocea nodosa*, *Cystoseira adriatica* and *C. schiffnerii* (Table 1).

Table 1 : Characheristics of new *caulerpa prolifera* population in the Adriatic Sea.

Location	First observation	Depth (m)	Substratum	Predominante species
Luka Dubrovačka bay	1977	8-10	sandy-mudy	*Rytiphloea tinctoria* (Clem.) C.Ag *Gracilaria verrucosa* (Huds.) Papen *Cladophora prolifera* (Roth) Kutzing
Skrivena Luka bay	1981	0.5-5	sandy, sandy-mudy	*Cymodocea nodosa* (Ucr.) Ascher *Rytiphloea tinctoria* (Clem.) C.Ag *Padina pavonica* (L.) Thivy
Starigrad bay	1995	1.5-3	rocky sandy	*Caulerpa taxifolia* (Vahl) C.Ag *Cymodocea nodosa* (Ucr.) Ascher *Cystoseira adriatica* Sauv. *Cystoseira schiffneri* Hamel

Opposite to Adriatic sea, *C. prolifera* is a very common species in other parts of the Mediterranean, specially on its eastern part covering mostly sandy-muddy and sandy bottom to 100 meters depth (14, 15). It grows with seagrasses *Cymodocea nodosa, Zostera noltii* and *Posidonia oceanica* (17, 18, 19). It can be concluded that *C. prolifera* in east Adriatic Sea settles on same type of bottoms as in other parts of Mediterranean. It occupies sandy or sandy-muddy bays up to 10 meters depth. On the contrary, in east Adriatic it forms small and sparse patches.