PHENOLOGY OF *POSIDONIA OCEANICA* (L.) DELILE IN THE GULF OF KOPER (GULF OF TRIESTE), NORTH ADRIATIC

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Abstract

Investigations were carried out in the only remaining *Posidonia oceanica* meadow in the Gulf of Trieste, the northernmost part of the Adriatic. The sampling site is located on the Slovenian part of the gulf, between the towns of Koper and Izola. The meadow is approximately 1 km long, it starts close to the coastline and it extends 50 meters off shore. A one-year investigation of the basic phenological parameters of the meadow started in April 1997. Together with the number of shoots per square meter the following parameters were studied: the number, length and width of leaves, the length of leaf sheaths, the Coefficient "A" and the Leaf Area Index. The results were compared with data from Banyuls-sur-mer and Port-Cros.

Key-words: Adriatic Sea, Posidonia, density, growth

Introduction

Posidonia oceanica (L.) Delile is together with *Cymodocea nodosa* (U.) Ascherson the most common seagras in the Mediterranean. It is widespread in the whole basin except for the area close to the strait of Gibraltar, the North Adriatic, the coast of Israel, the Bosphorus, the sea of Marmara and the Black Sea (1). According to an previous work of Benacchio (2) it was quite common also on the silty bottom of the Gulf of Trieste in the North Adriatic. Further investigations (3; 4) however showed a drastic change in its distribution in this northernmost part of the Adriatic. It is very likely that at present there is only one very restricted meadow of *Posidonia oceanica* in the Gulf of Trieste. The area is on the Slovenian coast between the towns of Koper and Izola. The mapping of the area that was carried out in 1993 (5) showed that the meadow is approximately 1 km long, starts close to the coastline (water depth 0.5 m) and extends 50 m off shore (water depth 4 m). The meadow is formed of islands of *Posidonia oceanica* of different sizes and shapes and does not fit into normal meadow types (6).

In order to establish the state of the meadow, its general features and its possible progression or decline in the future a one-year study of phenology and lepidocronology was started in 1997. The aim of the study is to obtain the basic information on the characteristics of the meadow and on the phenology of *Posidonia oceanica* in the Gulf of Koper. The final results will allow us to make an estimate of the dynamics of the meadow. The data from April 1997 presented in this preliminary report allow a tentative comparison with data from other sites in the Mediterranean basin.

Material and Methods

The sampling site is located on the Slovenian part of the Gulf of Trieste in the North Adriatic between the towns of Koper and Izola (Fig. 1).

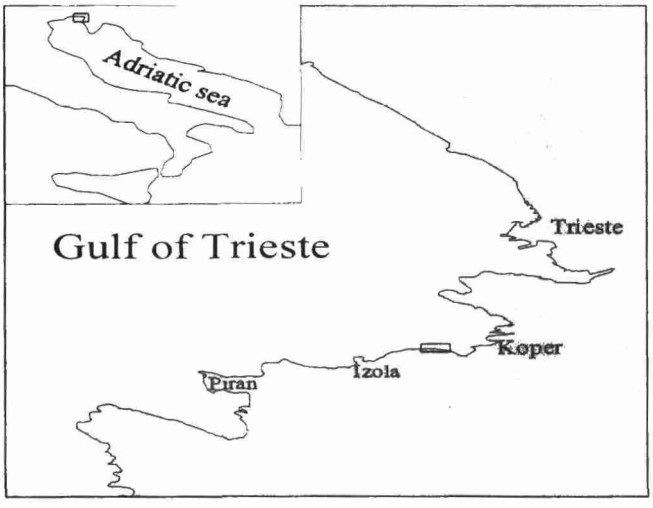

Figure 1 : The Gulf of Trieste (North Adriatic) with the investigated site.

The Gulf of Trieste is a shallow marine ecosystem where characteristics of the coastal and open waters of the Northern Adriatic are combined. With few exceptions the depth does not exceed 25 m. Because of its shallowness and the freshwater inputs as well, the waters of the gulf experience considerable temperature (8 - 26°C) and salinity (33 - 38‰) variations. Also remarkable is the tidal amplitude, which can be as much as 1.5 m. The transparency of the water is often quite low. The Secchi values for the Gulf of Koper can be as low as 3 - 4 m and hardly exceed 8 m (7). The transparency of the investigated area can be even lower due to the shallowness of the water , its proximity to the coastline, its exposure to the NE winds and as a consequence to the resuspension of the sediments.

The investigation was carried out in the central part of the area, on a more or less homogeneous part of the meadow. The site was 15 to 25 meters from the coastline, at a depth between 2 and 3 m, with the surface of approximately 1200 m^2. The number of shoots was counted *in situ* by SCUBA diving on a square of 0.14 m^2 at 8 different locations. Due to the fact that the investigation was carried out on the only remaining *Posidonia oceanica* meadow in the northernmost part of the Adriatic a limited number of only 15 shoots was taken for further phenological and lepidochronological analysis. Together with the number of shoots per square meter the following phenological parameters were studied: the number, length and width for the different categories of leaves - juvenile, intermediate, and adult (8) per shoot, the length of leaf sheaths, the L.A.I. (Leaf Area Index) and the Coefficient "A" (8). Mean values of the studied parameters for the whole sampling site were calculated. The results were compared with the data from other parts of the Mediterranean basin (9).

Results and Discussion

Meadow density

The density of the investigated meadow in the Gulf of Koper varies from 360 to 588 shoots per m^2 with the mean value being 460. The comparison with some of the data from the work of Pergent & Pergent-Martini (9) (Table 1) shows that the density of the meadow in Koper is relatively low considering the shallowness of the site and that it can be compared with the densities of meadows at much greater depths.

Table 1 : Mean density of *Posidonia oceanica* shoots per m^2 in the Gulf of Koper (North Adriatic) compared with the values from different stations (different depths) at Banyuls-sur-mer and Port-Cros (9).

	Koper	Banyuls-sur-mer				Port-Cros				
St.		B1	B2	B12	B19	P1	P2	P11	P23	P32
Depth	-2,5	<-1m	-2m	-12m	-19m	-0,7m	-2m	-11m	-23m	-32m
Density	460	1278	1163	535	367	942	645	317	283	205

Shoot and leaf structure

The mean values for some of the studied phenological parameters of the shoots and leaves of the *Posidonia oceanica* from the Gulf of Koper are shown in Table 2. The number of leaves (adult and intermediate) in the investigated shoots varies between 5 and 7 with the mean value of 5.9. Nine shoots out of 15 presented juvenile leaves.

The mean length of the adult leaves shows considerable variation (271 mm - 730 mm). It has to be considered, though, that the number of the adult leaves with damaged apexes is very high. The mean value of the Coefficient "A" for the adult leaves was calculated to be 90.5%. The high number of adult leaves with damaged apexes is comprehensible in view of the microlocation of the investigated site (high tidal amplitude, strong north winds and wave motion). A much lesser