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## CONTRIBUTION TO THE KNOWLEDGE OF 'BANQUETTES' OF *POSIDONIA OCEANICA* (L.) DELILE IN SARDINIA ISLAND

### Abstract

In the framework of the Sardinia and Corsica Interreg II Project, a study on the dead leaves of *Posidonia oceanica*, washed up along the beaches and forming banquettes, was carried out in different sites of the 2 islands. As far as Sardinia is concerned, biomass, biochemical composition (including heavy metals), detrital fractions and sand contents of the banquettes were investigated.

**Key-words:** *Posidonia oceanica*, banquettes, detritus, Sardinia.

### Introduction

The role of the detrital material of beach-cast algae and seagrass is far from being understood by those people involved in coastal management (Klug, 1980; Kirkman and Kendrick, 1997) and this material is often considered to be a waste and a dangerous product.

This study is part of the Interreg II Project between the islands of Sardinia and Corsica. It aims to contribute to the knowledge of *Posidonia oceanica* banquettes that are of practical importance. To this end, the biomass of the banquettes as well as their biochemical composition, sand content and proportion of detrital fractions were analyzed in 4 sites of NW Sardinia.

### Materials and methods

The investigated stations in Sardinia are located at San Giovanni beach (Alghero), Punta Negra (Alghero), Punta d'Elice (Stintino) and Punta Trabuccato (National Park of Asinara Island). The former three sites are located in areas where summer activities on the beach are very intensive.

Four samples of *P. oceanica* were collected from the *banquette* at each station: two on the shoreline, one superficial and one 50 cm deep (indicated respectively as 1S and 1P), and two about 5-6 meters behind the shoreline (2S and 2P). To differentiate the winter samples from the summer ones, the letters *i* and *e* were used respectively as abbreviations.

The wet weight/m<sup>3</sup> of *banquette* and the weight of dripped sand were determined from the samples. The total biomass of each *banquette* was calculated by means of the specific weight values and the volumes measured during topographic surveys. The detritus composition was obtained by discriminating five dimensional classes expressed as weight percentage as described by Martillotti *et al.* (1987) and AOAC (1995).

## Results

The biomass of the *banquettes*, expressed as ww, ranged between 10 t and 280 t at S. Giovanni, 10 t and more than 160 t at P.ta d'Elice (Fig. 1) and from 2 t to 15 t at P.ta Trabuccato. Their volumes were equal to 15.3 m<sup>3</sup>/m, 5.3 m<sup>3</sup>/m and 1.3 m<sup>3</sup>/m, respectively. In the first two cases, there is evidence of a great deposition in particular portions of the shore, whereas in the case of P.ta Trabuccato drift and accumulation are less massive but more uniform.

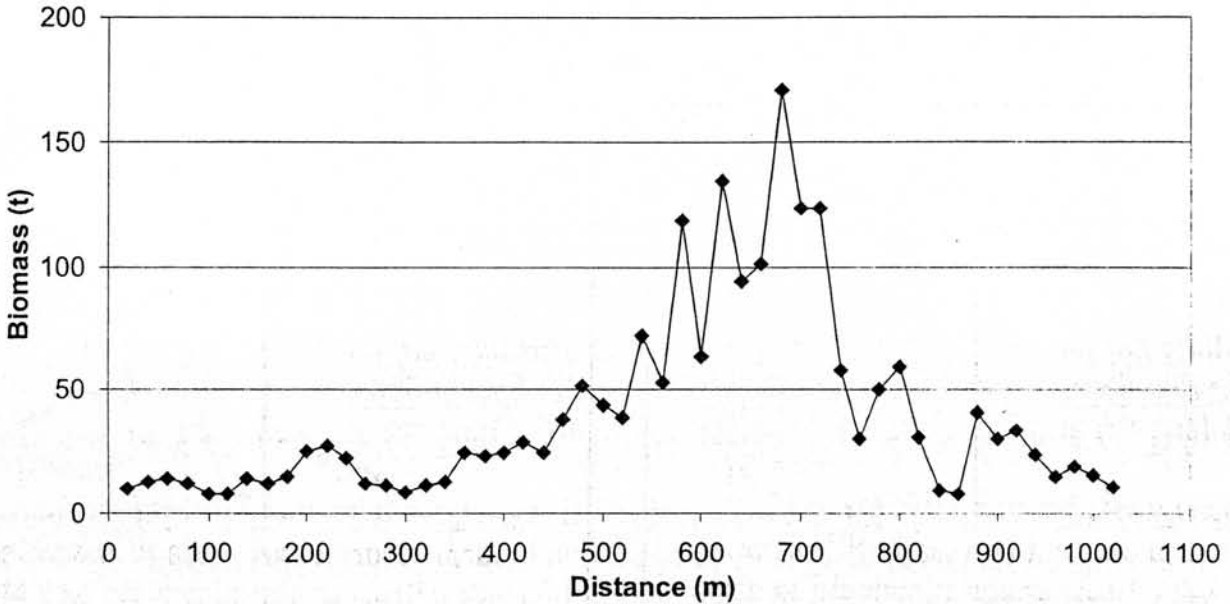


Fig. 1. Biomass of the *banquette* along the coastline of P.ta d'Elice (Stintino) during winter 1999.

The biochemical composition of detritus such as lipids, proteins, ashes, fibers and carbohydrates gave similar results for all stations, and this for all regions of the *banquettes* and for the two periods of the year examined. As an example, the data from S. Giovanni (summer) are shown in Fig. 2. The dead brown leaves exhibited a low protein content, combined with a high proportion of structural carbohydrates. This means that they are of poor nutritional quality in comparison to living seagrass fronds, as also stated by Fenchel and Blackburn (1979).

Concerning the heavy metals, the concentrations found in the *banquettes* of all sites were always very low (Fig. 3), and were below the limit imposed for Pb and Hg by the Italian legislation for sea-food.

The analysis of detritus revealed a low presence of rhizomes and an absence of intact shoots, and this at all of the stations examined. As far as the research period is concerned, this result demonstrates that the human impact on the facing prairies is moderate. Concerning the abundance of the detrital material, it must be observed that there has been a strong decrease from class 1 (greater values) to class 5 (smaller values) for all stations. On the contrary, the variations inside the single classes were very low (see Tab. 1 as example). In all the stations, the detrital fraction was mostly characterized by small sized fragments (<2 cm).

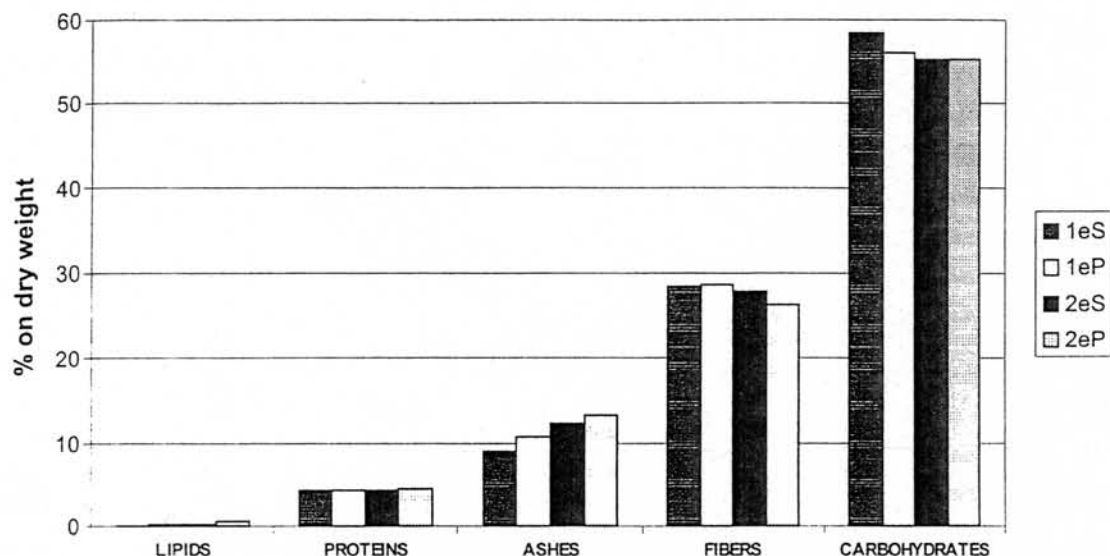


Fig. 2. Biochemical composition of the *banquette* along the coastline of S. Giovanni (Alghero) during summer 1999.

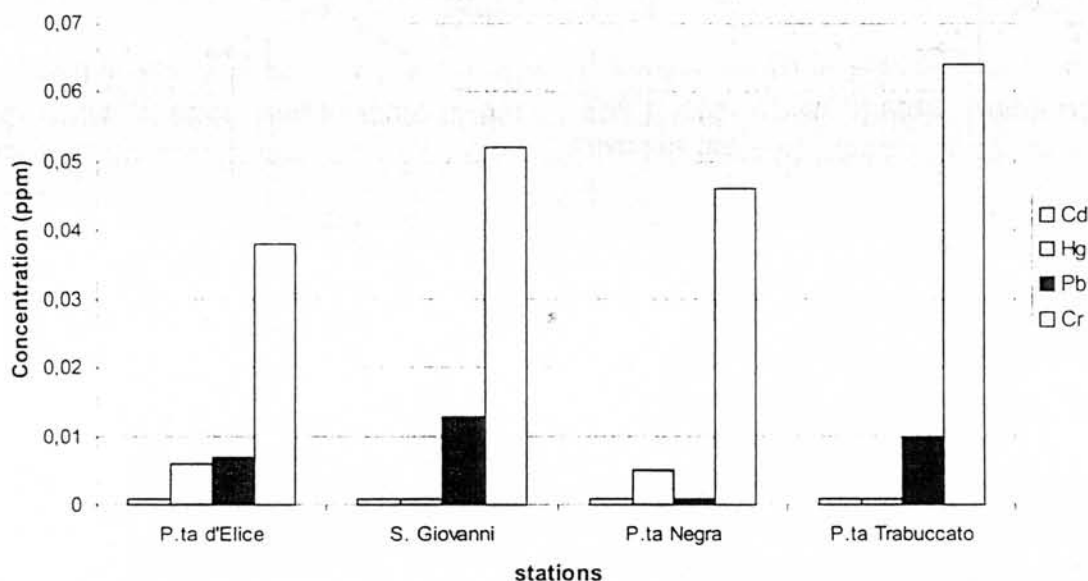


Fig. 3. Heavy metal concentrations found within the *banquettes* in Sardinia.

The sand content of the *banquettes* at the 4 stations, as well as in all samples from each station, showed a wide variability (see Jeudy de Grissac and Audoly, 1985). In terms of mean content, the highest values were found for P.ta d'Elice and P.ta Negra ( $43 \text{ kg/m}^3$ ), followed by P.ta Trabuccato and S. Giovanni, with  $7.3 \text{ kg/m}^3$  and  $1.1 \text{ kg/m}^3$ , respectively. This may be due to the fact that leaves are washed onto the beaches by hydrodynamic events of variable intensity, thus producing the removal and entrapment of different quantities of sand.

Tab. 1. Percent of detrital material classes of *Posidonia oceanica* in the *banquette* of S. Giovanni (Alghero).  
Class 1: <2cm ; Class 2: 2÷5 cm ; Class 3: 5÷10 cm ; Class 4: >10 cm ; Class 5: intact leaves.

	Class 1	Class 2	Class 3	Class 4	Class 5
1iS	61.12	24.43	8.8	0.05	0.41
1eS	80.46	13.27	5.01	1.11	0.12
1iP	64.19	20.99	9.86	4.55	0.38
1eP	86.28	10.7	2.55	0.37	0.08
2iS	98.75	0.8	0.43	0	0
2eS	71.56	17.03	8.99	2.28	0.11
2iP	100	0	0	0	0
2eP	71.88	18.82	7.36	1.93	0

## Conclusions

As the abundance of *banquettes* is correlated to the vegetative cycle of the prairies, it would appear that, along the studied coasts, the prairies, or at least portions of these, are under normal conditions. The higher biomass values of detrital material at S. Giovanni and P.ta d'Elice, in comparison to that of P.ta Trabuccato, could be due to local hydrodynamic events, modulated by coastal shape. In fact, the *banquettes* of S. Giovanni are the result of a multi-annual deposition.

The chemical parameters studied maintain constant concentrations during winter and summer. As far as heavy metals are concerned, the observed levels are very low and the *banquettes* must not be classified as dangerous material.

The removal of *P. oceanica banquettes* using the current beach cleaning techniques is unadvisable not only due to erosion factors but for the great quantities of sand that would be lost.

## References

- AOAC (1995) - *Official methods of analysis*. Association of Official Analytical Chemist 1995, Washington DC.
- FENCHEL T., BLACHBURN T.H. (1979) - *Bacteria in detritus food chains. Bacteria and Mineral Cycling*. Academic Press, London: 52-78.
- JEUDY DE GRISSAC A., AUDOLY G. (1985) - Etude preliminaire des banquettes de feuilles mortes de *Posidonia oceanica* de la region de Marseille (France). *Rapp. Comm. Int. Mer Médit.*, 29, 5.
- KIRKMAN H., KENDRICK G.A. (1997) - Ecological significance and commercial harvesting of drifting and beach-cast macro-algae and seagrasses in Australia: a review. *Journal of Applied Phycology*, 9: 311-326.
- KLUG M.J. (1980) - Detritus-Decomposition Relationships. In: *Handbook of Seagrass Biology: An Ecosystem Perspective*. R.C. Phillips, C.P. Mc Roy (Eds.), Garland STPM Press, N.Y.: 225-245.
- MARTILLOTTI F., ANTONGIOVANNI M., RIZZI L., SANTI E., BITTANTE G. (1987) - Metodi di analisi per la valutazione degli alimenti d'impiego zootecnico. *Quaderni metodologici* n.8. Grafica Tiburtina.