

POSSIBILITIES OF VALORIFICATION OF MAIN MACROPHYTIC ALGAL BIOMASS FROM THE ROMANIAN BLACK SEA SHORE

POSSIBILITĂȚI DE VALORIFICARE A BIOMASEI PRINCIPALELOR GRUPE DE ALGE MACROFITE DE LA LITORALUL ROMÂNESC AL MĂRII NEGRE

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Abstract: Ocean and marine vegetation is dominated by algae, rocky shores being abundantly covered with macrovegetation that is almost exclusively seaweeds. Although the Black Sea shore is not very long and the conditions of the water are particular compared with other seas, we can find here some species that develop large biomass that make them suitable for harvesting and utilisation in different ways. In this paper we evaluated macroalgal biomass of some common genera of green and red alga (Chlorophyta and Rhodophyta) from our coasts. As the values are quite noticeable it is possible to use this valuable biomass as fertilizing resource, food for animals or as raw material source for medicine and pharmacy.

Rezumat: În această lucrare sunt prezentate valorile biomasei principalelor specii de macroalge verzi și roșii de la litoralul nostru în urma prelevărilor efectuate pe parcursul a 5 ani în diferite puncte situate de-a lungul zonei costiere. Cantitatea semnificativă de material algal este un posibil argument pentru posibilitatea utilizării acestuia în diferite moduri: ca fertilizant, hrană pentru animale sau materie primă pentru industria farmaceutică.

Key words: macroalgae, Black Sea, Chlorophyta, Rhodophyta, biomass
Cuvinte cheie: macroalge, Marea Neagră, Chlorophyta, Rhodophyt, biomasă

INTRODUCTION

In many parts of the world, like Japan, China and other Asian countries, as well as in other regions, people collected sea-weeds from long time ago. The primary uses of seaweeds are as animal fodder, fertilizers or sources of phycocolloids and on this respect, wild stocks are usually harvested and managed. In recent years, seaweeds have also been considered as potential solar energy converters, to provide biomass as a source of nutrients and energy for methane-producing bacteria (LOBBAN, HARRISON, 1997).

If used in human diet, seaweeds provide carbohydrates, proteins, vitamins and various minerals. For commercial use are also the phycocolloids (agar, carrageen, and alginates) that are extracted from red and brown algae. In medicine and pharmacy, they are used as a source of antitumoral, antimicrobial, antiviral and anticoagulant substances (PETERFI, IONESCU, 1976).

In the past years, especially in the past 40-50 years, the practice of collecting seaweeds has grown and changed, from the process of simply harvesting, to the processes of selecting, breeding and cultivating certain species.

However, in our country, there have been a number of researches and experiments in order to introduce macroalgae in agriculture, as soil fertilizers and in zootechny as food for domestic animals (BOLOGA, 1980; PETERFI, IONESCU, 1976).

But, unfortunately in our country, macroalgal industry is not developed and there is no interest in harvesting as well as in cultivating seaweeds.

The present paper will show the biomass of the most important genera of green and red algae from our coast, in order to appreciate if this biomass could be of economical importance and harvesting could be taken in consideration.

MATERIAL AND METHOD

Present research took place in a period of 5 years (2000-2005). Samples of macroalgae were taken from five sites situated along the Romanian Black Sea Shore, between Constanța (in the north) 2 Mai (in the south) (Fig.1). The algal material was collected in different periods of the year, in cold season as well as in warm season, from various types of hard substratum.



Fig.1. Macroalgal sampling points at the Romanian Black Sea shore

The most common species of green algae (Chlorophyta) founded in the samples were: *Ulva rigida* (syn. *Ulva lactuca*) (Fig.2), *Enteromorpha intestinalis* (Fig.3) and *Cladophora vagabunda* (Fig.4) as well as related species of each.



Fig.2. *Ulva rigida*



Fig. 3. *Enteromorpha intestinalis*



Fig. 4. *Cladophora vagabunda*

Rhodophyta filum was represented mainly of *Ceramium* species, *Ceramium rubrum* being the most abundant, together with *Ceramium elegans* and *Ceramium diaphanum*.

For biomass estimation three samples were randomly taken from a surface of 100 cm² at each depth (between 0, 5 - 7 m); the algal material was washed and cleaned of epibiosis, dried 24 hours at 105^oC and than weighed.

RESULTS AND DISCUSSION

In the marine coastal area, the bioproductive importance of macrophytobenthos is very high. The algal biomass evolution of both green and red algae, in the five years of study and in all sampling sites is illustrated (Fig.5).

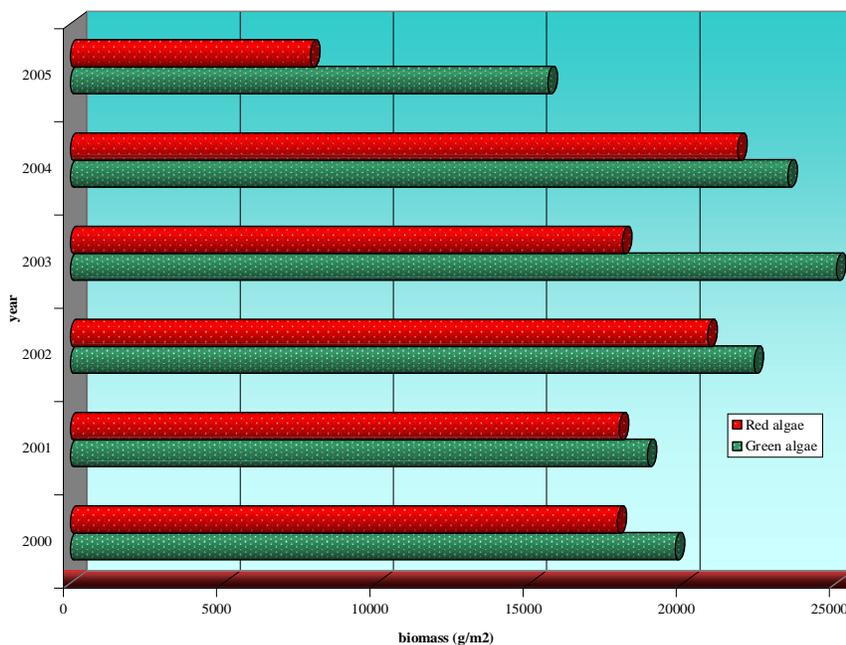


Fig.5. Biomass evolution (g/m²) between 2000-2005 of Chlorophyta and Rhodophyta from the Black Sea Shore

These observations show that the values of red algae biomass were almost the same in 2000 and 2001, increased over 20 000 g/m² in 2002 and slightly decreased again next year. The maximum value was registered in 2004, 21 772 g/m², and the lowest in the following year (7830 g/m²). As for the green macrophytes, in 2000 and 2001, their biomass was around 19 000 g/m² and increased over 20 000 g/m² in 2002. Unlike the red algae, green algae show a maximum of development in 2003, after that a slight but gradual decrease took place in 2004 and 2005. It is evident that green algae prevailed in all the mentioned period, even if in some years (2001, 2002) the biomass values were very close. On the other hand, it is to be mentioned that the high biomasses of red algae are due to the *Ceramium* species and those of green algae are due to a number of species from different genera (*Ulva*, *Enteromorpha*, *Cladophora*).

These values of biomass both of green and red algae, sometimes noticeable especially during summer are due to the particular conditions of eutrophised coastal waters with nutrient excess that favour their massive development. The actual observations corroborate with previous investigations (SAVA, 2000; SAVA ET AL., 2003).

CONCLUSIONS

Our investigations showed that macroalgal species of green and red algae have high values of biomass, with green algae dominating in the research period. The biochemical conditions of our coastal waters, together with the fast growing capacity of these species, are the main reasons why these macrophytes develop and dominate over other species.

Taking that in consideration, we can appreciate that these biomasses can be used in different ways, being aware that in present days, macroalgae are harvested for different uses in Far East countries as well as in some European developed countries.

It is obvious that the sea can provide plenty of reaches and research must be further done in order to know and use them.

LITERATURE

1. BALABAN DOINA PAULA, ROSOIU NATALIA, BUSURICU FLORICA, SAVA DACIANA, *Etude preliminaire concertant la separation d'un melange d'alginate de l'algue brune Cystoseira barbata* – Rapp. Comm. Int. Mer. Medit, 37: 485, Barcelone, Spania, 2004.
2. BOLOGA A.S., *Algele macrofite marine și utilitatea lor economică la litoralul românesc al Mării Negre* - Pontus Euxinus 1980, vol I: 207-211.
3. LOBBAN C., HARRISON P., *Seaweed Ecology and Physiology*, Cambridge University Press, USA, 1997, 367 pp.
4. PETERFI ST., IONESCU AI. – *Tratat de Algologie*, Editura Academiei R.S.R., București, 1976, 590 pp.
5. SAVA DACIANA, *Observații preliminare asupra biomasei algelor macrofite marine de la litoralul românesc al Mării Negre*, Acta Botanici Bucurestiensis, 27: 199-206, 2000.
6. SAVA DACIANA, ARCUȘ MARIANA, DOROFTEI ELENA, BUȘURICU FLORICA, BALABAN DOINA- PAULA, *The latest data on the qualitative structure of macrophytobenthos from the Romanian Black Sea Shore* - 4-th International Conference of PH students, Miskolc, Hungary, pag 365-370, 2003.