Determination of luxuriance of rolling *Calcareous thalli*

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The determination of the luxuriance of rolling calcareous algae has been the basis of a study of the Northern Adriatic circalitorial phytocoenoses dynamic (NICHETTO & BRESSAN, in presentation).

This study considered the vegetal forms present on the mobile bottom crossed by currents, offshore Grado, Caorle and Venice.

The species of the area are mostly free forms: *Lithophyllum racemus* (LAMARCK) FOSLIE, *Lithothamnium corallioides* CROUAN, *Phymatolithon calcareum* (PALLAS) ADEY et MC KIBBIN, *Spongites (Lithothamnium) fruticulosa* KUTZING and *Lithothamnion valens* FOSLIE.

The perennial and carbonatic structure of these algae make their presence possible in the sediment for many years.

Making a distinction between living and dead thalli is therefore indispensable for areal mapping.

Alga vitality or luxuriance can be estimated by the evaluation of:

- photosynthesis (production)
- reproduction
- developement (differentiation and growth).

But it is not very easy to determine the reproduction period of maërl species (conceptacles mainly immersed in the thallus) and its growth intensity (the dimensions vary with its age and also with its rolling capability). Therefore it seemed proper to observe the photosynthetic capability, which is easier to analyse.

Two series of analysis were made:

I period (1989-90): observation of:

a) oxygen production of in-situ incubating, by the Winkler method;

b) the status of the pigments (spettrophotometric analysis of Chlorophyll a and R-Phycoerythrins);

c) previous data elaboration.

The application of the methods required a calibration period, which showed that the usage of *Lithophyllum racemus* (more abundant in the different colours) is preferable.

II period (1991): search for proof of the results of the previous period, by means of a different approach which involves:

a) oxygen production measures, using the Clark electrode (DELIEU T. & D.A. WALKER, 1972; WALKER D.A., 1987);

b) chlorophyll extraction by N-N-dimetil-formammide and her subsequent spettrophotometric analysis at 730nm and 665nm;

c) weighing of the samples;

d) data elaboration.

This permitted the laboratory re-creation of the natural environment and the usage of the same thallus for the pigment analysis. The latter approach made possible the correlation of the oxygen quantity production with the pigment producer.

The results of the I period (tab.1) showed a different capability of oxygen production by R algae (code scale Seguy: 9, 14, 72, 74, 89, 105, 143, 148 red), from the B ones (code scale Seguy: 193, 199 white) and the G ones (code scale Seguy: 133 grey). Instead the M algae (code scale Seguy: 112, 131, 201 brown) demonstrated intermediate behaviour. The analysis of the pigments confirmed the sharp difference of viability between the R thalli and the others.

The results of the II period follow the same trend as the I set of analysis (tab. 2 & fig.1). The R algae were statistically (test of Student) separated from the M, B and G ones, on each day of analysis, from June to November.

Therefore we can conclude that only the R thalli can be considered alive.

In mapping the areas the proportion between the R and M, B, G ones should be considered to ascertain the greater or lesser luxuriance of an areal.

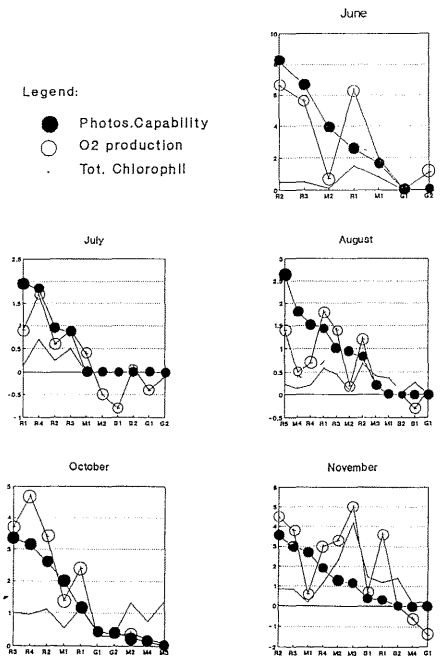

Fig. 1.- Grafic elaboration of data

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Production of Barnacles in a brackish lagoon in the Po delta

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On a evalué la production secondaire d'un peuplement à Balanes (*Balanus improvisus, B. eburneus, B. amphitrite)* dans une lagune saumâtre du delta du Po. La valeur de 51 g/dm^2/an confirme l'importance de ce groupe d'animal dans la composition des communautés de la lagune.

Barnacles, represented by *Balanus improvisus* Darwin, *B. eburneus* Gould and *B. amphitrite* Darwin, form one of the most substantial parts of the macrobenthos of the hard substrate in the Po delta area and in particular of the "Sacca del Canarin" (RELINI *et al.* 1978-1985).

The Barnacles in the Po delta area have been studied since 1977 and among the published we would like to draw attention to : RELINI 1981; RELINI and FASCIANA 1982-1985-1989.

In order to estimate the secondary production of a population of three species of Barnacles in the Sacca a station was chosen at the centre of the lagoon, at a depth of 80 cm, which is greatly influenced by the marine inflow. For one year, from 1st June 1990 to 31st May 1991, cement-asbestos panels were immersed for periods varying from 2 weeks to 12 months.

Subsequently the central dm^2 of both sides of the panels was examined in order to evaluate the density, the size, the maturity of the individuals, the developmental stage of any possible embryos. The weight values of the whole of the fouling and of the share of Barnacles were expressed in terms of wet weight, dry weight and weight of ashes.

All three species show a summer-autumn recruitment. From June to October and beyond, only 2 week after being fixed on the substrate the Barnacle population already starts to contribute to the total biomass expressed in dry weight, and to the production of inorganic substances with percentages which are very often over 50%. During the study period the maximum value of the biomass was registred after 9 months of immersion, 68g/dm^2, with a density of 278 ind./dm^2 . On the annual panel a biomass of 55g/dm^2 and a density of 282ind./dm^2 was registered.

In order to measure the secondary production we applied two approaches suggested by CRISP (1971) for benthonic populations which do not present recruitment or applicable to any recruitment of species whose density and weight can be measured with continuity. The two formulas used are :

$P_1 = \sum_o^t N \Delta \varpi$

N= average number of individuals in the time interval.

$\Delta\varpi$= increase in average individual weight in the time interval.

$P_2 = N_t\varpi_t + \sum_o^t \varpi \Delta N$

$N_t\varpi_t$ = biomass present at time t.

ϖ = individual average weight.

ΔN= variation in density in the time interval.

The results were : P_1 =54g/dm^2/year and P_2=50g/dm^2/year.

In a Barnacle population the death does not correspond to the disappearance of shell of the Cirriped which remains stuck to the substrate.

In the theoretical population considered by Crisp, on the other hand, the density corresponded to the number of living individuals and mortality could be calculed theoretically as the difference in density between the two time intervals.

Thus, using real data of the number of living and dead individuals and giving a realistic estimate of the weight of a single living individual, a calculation was made, with the first formula, of a third production value P_3=51g/dm^2 year which falls into the previously estimated interval.

This value demonstrates the important role played by Barnacles in the ambit of the biocoenosis of this lagoon and confirms the high productivity of the northern zone of the Adriatic Sea.

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