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LONG-TERM EFFECTS OF DIFFERENT FOODS ON FOUR MEDITERRANEAN SPECIES OF GORGONIANS

EFFETTI A LUNGO TERMINE DI DIFFERENTI DIETE IN QUATTRO SPECIE DI GORGONIE MEDITERRANEE

Abstract - *About four species of Mediterranean gorgonians (*P. clavata, E. cavolinii, E. singularis, E. verrucosa*) we have analysed the effects of three different foods on growth, activity rhythm of polyps and rate of regeneration. The aim of this paper is to show the presence of food preference by the four species and the influence of the food on the growth rhythm and the regeneration processes.*

Key-words*: Octocorals, feeding, growth, regeneration.*

Introduction - Gorgonians are considered passive filter feeders and represent one of the main link joining pelagic and benthic food webs (Gili & Coma, 1998). Gorgonians are strongly suited to extract food from column water, but knowledge about quality and quantity of the collected food is fragmentary. Several experimental studies on feeding have considered gorgonians as consumers of zooplanktonic prey items (Tsounis, 2005) while new studies on the feeding activity suggested that the extent of herbivory among cnidarians has been underestimated and should be properly evaluated. Here we tested in aquaria the optimal diet for long-term maintenance of four common species of Mediterranean sea fans, evaluated considering the influence of food on different aspects of their biology: growth, activity rhythm of polyps and rate of regeneration after an artificial lesion.

Materials and methods - In order to evaluate the effect of different foods on gorgonians, four common species (*P. clavata*, *E. cavolinii. E. singularis* and *E. verrucosa*) were maintained in aquarium (Aquarium of Genoa) and fed daily, at the same time, for 18 months, with one of three different food types as follows: mix of *Nanochloropsis* sp. And *Thetraselmis suecica;* suspension of powdered fishery-food sieved (to mimic Suspended Particulate Matter, SPM) and *Artemia salina* nauplii. The long-term effects of the different diets were evaluated considering the growth rate by means of a calliper, the activity rhythm based on the expansion/contraction of the polyps by video recording and the regeneration rate after partial lesion of the coenenchyme. The growth of the damaged tissue was measured weekly and the time employed by the colonies to totally regenerate the living tissue recorded. Data were processed using Scheirer-Ray-Hare Test; moreover, the capability of regeneration of each species providing the three different types of food was tested using the Kruskal-Wallis ANOVA. We used the Kruskal-Wallis ANOVA and a Multiple Comparison Test to compare the regeneration rate of the four species, considering exclusively their average values.

Results - The three different diets affected the growth of the four species (Scheirer-Ray-Hare Test: vs. species $0.001<P<0.01$). All the species showed positive growth rates (about 0.5 cm/year) when fed with algae (Wilcoxon Test $P<0.06$). SPM and *A. salina* affected negatively the growth of the colonies. *E. verrucosa* was the only species that

showed positive growth with all three diets (Wilcoxon Test: P<0.06), in particular when fed with *A. salina*. The species showed significant differences regarding the expansion time of the polyps (Scheirer-Ray-Hare Test: vs. specie P<0.001). *P. clavata* polyps were expanded more than 80% of observation time when fed with algae or SPM but this value decreased slightly when they were fed with *Artemia salina*. *E. cavolinii* showed the highest values of expansion when fed with *A. salina* and the lowest when fed with algae.

Conclusions - Results show a positive rate of growth only for *E. verrucosa* and with every kind of diet, even if *A. salina* can be considered the best food for this species. *E. singularis* and *E. cavolinii* better survive when fed with algae. Also *P. clavata* better survived when fed with algae, showing a high variability of growth when fed with *A. salina*. About the activity rhythms *P. clavata* and *E. verrucosa* showed long periods of polyp expansion with every kind of food. *E. cavolinii* showed the maximal duration of expansion when fed with *A. salina* nauplii, while *E. singularis* had the maximal time of polyp expansion (about 50%) when fed with algae. About the regenerative processes we can conclude that *P. clavata* regenerate more slowly (about half time) than the species of the genus *Eunicella*. Besides the regeneration processes were found not influenced by diet. In the natural environment, tissue loss allows fouling organisms to colonize rapidly the naked scleraxis, negatively affecting regenerative processes (Bavestrello *et al*., 1997). The evaluation of regenerative ability of species that experienced mass mortalities represents important information to estimate the resilience of the damaged populations (Cerrano *et al*., 2005). While gorgonians are generally considered as passive filter feeders (Gili & Coma, 1998), several authors consider them as carnivorous predators and few reports indicate that they do engage in herbivory (Ribes *et al*., 1998). Results showed in this study could be a confirm of the hypothesis that some species of gorgonians might not be considered neither as passive filter feeders, nor predators, but as selective filter feeders, with a preference for a carnivorous or a herbivorous diet depending on the considered species.

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