THE COLONIZATION OF EXPERIMENTAL ARTIFICIAL REEFS, FROM THE SERPULIDS POLYCHAETES, IN THE N. AEGEAN SEA (GREECE). PRELIMINARY RESULTS

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Abstract

This study presents the preliminary results concerning the fouling community of Serpulid polychates on an artificial reef deployed in the coastal waters of Fanari in October 1999, at a depth of 25 m. The reef was formed of cubic concrete blocks arranged in pyramids. The samplings were performed seasonally and the survey of the reef is still in progress. The analysis of the first 2 sampling periods shows a clear dominance of Serpulids among the faunistic components and a great amount of similarity between all samples in terms of numerical abundances.

Keywords: artificial reefs, Aegean Sea, polychaeta

The establishment of artificial reefs consists worldwide an important measure for the management of coastal marine ecosystems (1,2). The artificial reefs during the last ten years proved to be a very effective mean for the protection and the increase of local fish stocks (3,4). In Greece in July 1998 the first experimental reefs were deployed (5) and during October 1999 the first extensive protective zone with artificial reefs occupying an area of 6 Km^2, was constructed and deployed at cape Fanari (Vistonikos gulf).

Materials and Methods

The artificial reefs. The deployment area was selected after an extended pilot study of the broader coastal area (figure 1). The sea-bed of the study area is covered by a well-developed and continuous *Posidonia oceanica* meadow containing patches of completely degrading area, where the meadow is replaced by sandy sheets with organic detritus characterized by the presence of *Turitella communis* (6). The reefs were formed of cubic concrete blocks (2 x 2 x 2 m) arranged in pyramids. Each pyramid is made by 5 blocks, 4 at the base and I at the top (3). At the sides of the blocks holes of different diameter were created. In order to study the colonization of the reef from invertebrates, square concrete plates (35 x35 cm2) were placed at the 2 upper corners at each side of each block. A total of 9 pyramids were established at a depth of 25m in an area occupying 3 500m2 together with other types of artificial reefs, creating the nucleus of the protective zone.

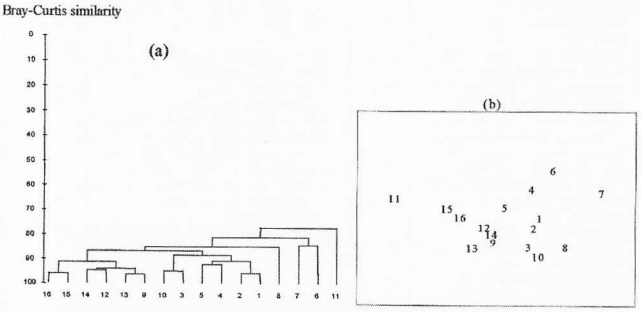

Figure 1. Results of (a) cluster and (b) multidimensional scaling (stress value = 0.106), based on Bray-Curtis similarity index, of the cement blocks immerged in autumn of 1999. From 1-8 are the samples during March (5 months of submersion) and from 9-16 are these during May (7 months of

Data collechon and analysis. The reefs were visit seasonally and 8 plates (35x35 cm^2) were collected by divers and transferred to the laboratory, where the surface of each block was scrapped and all selected organisms were preserved in 10% formalin. All faunal elements were counted and identified at species level. Specifically the Serpulids proved to be the main taxon representing more than 80% of the fauna in terms of numerical abundance. Consequently the study of reef colonization was restricted to family Serpulidae. These faunal data were analyzed using one way-ANOVA, cluster and multidimensional scaling techniques, based on the Bray-Curtis similarity and >1 transformed numerical abundances, using PRIMER (8,9). The significance of the multivariate results was assessed using ANOSIM test (9).

Results and Discussion

Overall 5.044 Serpulids were counted belonging to 6 species (Table l). We can easily detect that the two most important species, in terms of numerical abundance and dominance are *Spirobranchus polytrema* and *Pomatoceros triqueter*. The number of species is higher during the first period (March 2000 - 6 species and May 2000-4 species), probably due to different biotic factors (mainly intra-specifique competition, reproductive strategies). The deployment area was highly productive, so the limiting factor was the availability of hard substrate. As the species compete each other in order to occupy the free space and with the addition of different

Table 1. Distribution of Serpulids found on the plates of the artificial reef during the two sampling periods, *(Mab = mean abundance, Mdom = mean abundance).*

Species	March 2000		May 2000	
	Mab	Mdom	Nlab	Aldom
Serpula vermiculans	12.50	4.45	18.38	5.26
Placostegus tridentatus	3.13	1.11	0.00	0.00
Hydroidespseudouncinata	11.00	3.91	11.50	3.29
Pomatoceros triqueter	47.38	16.85	127.88	36.60
Spirobranchus polytrema	207.00	73.63	191.63	54.85
Vermilliopsisinfundibulum	0.13	0.04	0.00	0.0

growth rates, a replacement of the most vulnerable occur (7). These two dominant species seems to be the best adapted during these first stages of colonization process. The results of cluster and MDS are shown at figure 2. The stress value for the 2- dimensional MDS configuration was 0.106 indicating good group separations with no real prospect of a misleading interpretation (8). The results of ANOSIM (R= 0.74, significance level is 0.1%) indicate discrimination between the groups of samples, so the cluster is confirmed. We can detect 5 main groups. The 2 major ones, group together the samples of each period with the exception of 6 and 7 that form a unique cluster, the sample 8 that discriminates alone and the samples 10 and 11 that form the 5~ cluster. A strong degree of similarity between samples seems to occur. The perform of one-way ANOVA (F=4.894, p=0.04 1) indicates the rejection of the null hypothesis: no differences among samples exist in terms of numerical abundance, at 95% significant level. The artificial reef was deployed at a eutrophic area, which explains the dense colonization from Serpulids that are typically filter-feeder organisms. Moreover Serpulids have proved to be the first organisms of fouling that settle after the development of the bacterial film (10). This may be an explanation of the observed high level of similarity. In addition, the time period in-between the 2 samplings were only 2 months and no truly seasonality was detected from the main abiotic factors. This suggests that the differences among the microhabitats are not significant and so the development of the reef is expected to be uniform. The survey of the reef is still in progress.

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