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## BENTHIC ASSEMBLAGES ON ARTIFICIAL PYRAMIDS ALONG THE CENTRAL AND NORTHERN ADRIATIC ITALIAN COASTS

### POPOLAMENTI BENTONICI SU PIRAMIDI ARTIFICIALI LUNGO LE COSTE ITALIANE CENTRO E NORD ADRIATICHE

**Abstract** – Benthic assemblages living on Tecnoreef® pyramids off Scardovari (Po river delta, Veneto region) and Pedaso (Marche region) were investigated three years after their deployment. Even though analysed artificial reefs had same material, depth and age, their benthic assemblages were significantly different. Scardovari assemblages were characterised by *Sabellaria spinulosa* and *Epizoanthus* sp. which could take advantage of the high water turbidity, sedimentation rate and nutrient load due to the closeness of the Po river mouth. Besides, *Mytilus galloprovincialis* could provide habitat for *Corophium acherusicum* on Pedaso reefs.

**Key-words:** artificial habitats, fouling, zoobenthos, Adriatic Sea.

**Introduction** - Sessile and motile species colonise artificial reefs according to complex ecological processes affected by seasonal larval supply, water circulation, turbidity and nutrients, depth, orientation and material of the substrata (Ardizzone *et al.*, 1989; Turner and Todd, 1993; Rodriguez *et al.*, 1993; Relini *et al.*, 1994; Nicoletti *et al.*, 2007).

Starting from the '60 more than 70 artificial reef complexes, built of different materials, were deployed along the Italian coasts. In the present study benthic assemblages colonizing concrete pyramids were investigated in two central and northern Adriatic sites: Scardovari and Pedaso, 120 nm apart.

**Materials and methods** - At each study site, artificial reefs include few dozen of Tecnoreef® pyramids (2 and 3 floors, 1.8 and 2.4 m height), made by 'sea-friendly' reinforced concrete, manufactured using only natural components without synthetic additives, deployed at 13-15 m in depth. Pedaso (AP, Marche region, 43°05'N 13°54'E) reefs were deployed in the summer 2005, while those of Scardovari (RO, Veneto Region, 44°54'N 12°33'E) were deployed in autumn 2006. Macrobenthic assemblages were investigated in august, 3 years after the deployment, by scraping off 4 replicate samples of 40x40 cm using hammer and chisel. Species were identified to the lowest possible taxonomic level and their abundance was estimated as number of individuals per square decimetre. Differences between sites were assessed by uni- and multivariate permutational analysis of variance (PERMANOVA, Anderson and ter Braak, 2003).

**Results** - On overall, 61 taxa were identified, 25 common between the two sites. *Corophium acherusicum* was the most abundant species, followed by *Sabellaria spinulosa*, and *Polydora ciliata*, all of them present at both sites. Assemblages appeared significantly different between sites (PERMANOVA  $P < 0.05$ ). Taxa that better explain the observed Bray-Curtis dissimilarity between Scardovari and Pedaso assemblages are reported in Tab. 1. In particular, *Corophium acherusicum*, often associated with the mussels, was significantly more abundant at Pedaso, while *Sabellaria spinulosa* characterised the Scardovari assemblages. Mean species richness didn't differ between sites while Shannon diversity and Pielou evenness resulted significantly higher at Scardovari.

Tab. 1 - Taxa that better explain the observed Bray-Curtis dissimilarity between Scardovari and Pedaso assemblages (mean abundance, ind. dm<sup>-2</sup>±s.e., individual and cumulative contribution).

Taxa che maggiormente spiegano la dissimilarità di Bray-Curtis tra i popolamenti di Scardovari e Pedaso (abbondanza media, ind. dm<sup>-2</sup>±e.s., contributo individuale e cumulativo).

Taxa	Scardovari		Pedaso		Contrib%	Cum.%
<i>Corophium acherusicum</i>	26.17 ±	8.17	167.42 ±	59.97	15.82	15.82
<i>Ericthonius punctatus</i>	0.00 ±	0.00	15.28 ±	6.20	8.11	23.93
<i>Sabellaria spinulosa</i>	22.45 ±	10.00	1.53 ±	0.73	7.79	31.72
<i>Elasmopus rapax</i>	0.00 ±	0.00	10.47 ±	4.97	6.58	38.29
<i>Epizoanthus</i> sp.	5.30 ±	1.71	0.00 ±	0.00	5.24	43.53
Actinaria ind.	3.80 ±	1.30	15.81 ±	5.02	4.69	48.22
<i>Polydora ciliata</i>	3.42 ±	0.83	16.61 ±	7.17	4.67	52.89
<i>Anomia ephippium</i>	2.56 ±	1.12	9.50 ±	5.04	3.60	56.49
<i>Mytilus galloprovincialis</i>	0.09 ±	0.06	3.02 ±	1.52	2.89	59.37
<i>Serpula vermicularis</i>	2.06 ±	0.28	0.13 ±	0.04	2.84	62.21
<i>Stenothoe valida</i>	0.00 ±	0.00	2.09 ±	1.43	2.45	64.66
<i>Pomatoceros triqueter</i>	4.64 ±	0.71	7.84 ±	3.98	2.25	66.91
<i>Modiolarca subpicta</i>	1.22 ±	0.64	0.91 ±	0.35	1.69	68.60

**Conclusions** - Even though the two artificial reefs had same typology, material, and depth and were sampled at the same age (three years after the deployment), the benthic assemblages found at Scardovari and Pedaso were well differentiated. Species characterizing Scardovari assemblages included *Sabellaria spinulosa* and *Epizoanthus* sp. which could benefit of the higher water turbidity, sedimentation rate and nutrient load due to the closeness of the Po river mouth. Moreover *Sabellaria spinulosa* produces secondary substrate that could increase substratum heterogeneity and therefore species diversity.

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