

PRELIMINARY STUDY ON THE BIVALVIA ASSEMBLAGES OF THE NORTHERN ADRIATIC SOFT BOTTOMS



Vedrana NERLOVIĆ and Ana TRAVIZI



Ruđer Bošković Institute, Center for Marine Research, G. Paliaga 5, 52210 Rovinj, Croatia, E-mail: vedrana.nerlovic@cim.irb.hr

INTRODUCTION

Benthic communities represent powerful tools for detection of natural and anthropogenic disturbance, but also for assessment of marine ecosystems stability. Present study is a part of comprehensive investigation on the soft bottom benthic communities in the northern Adriatic circalittoral zone. It aimed to compare and characterize the assemblages structure and seasonal dynamics of Bivalvia associated with three different benthic communities, i.e. biocoenoses of coastal detritic (DC), muddy detritic (DE) and shelf-edge detritic bottom (DL), (Fig. 1., Fig. 2.). This study dealt with communities experienced heavy disturbance due to oxygen crisis in 1989 [1]. On that occasion Bivalvia were proved to be an excellent indicators of disturbance and ecosystem instability. The results of biennial post anoxic monitoring indicated partial recovery of benthic communities as well as Bivalvia assemblages [1, 2]. In the meantime the anoxic conditions were not repeated. Thus, we expect that recovery of benthos within investigated area is achieved. To test hypothesis on the resilience of benthic communities, assemblages structure and dynamics of Bivalvia were investigated.

INVESTIGATED AREA

NORTHERN ADRIATIC SEA: shallow depth (< 50m), semi-enclosed water body, water column stratification, high riverine input (the Po river), high primary production sensitive marine ecosystem.



Fig. 1. Study area with sampling sites.

sites:	SJ 005	SJ 007	SJ 107
φ	45°18,4'N	45°17,0'N	45°02,8'N
λ	13°08,0'E	13°16,0'E	13°19,0'E
depth:	31m	31m	37m
distance:	17nm	13nm	13nm
sediment:	silty-sand	silty-sand	silty-sand
sand (%):	57	69	62
grain (μ):	101	107	84
sorting (Φ):	3,05	2,39	2,38

BIOCOENOSIS (Fig.2)
Muddy detritic bottom (DE)
Shelf-edge detritic bottom (DL)
Coastal detritic bottom (DC)

MATERIAL AND METHODS

sampling: March-December 2005 (seasonally)
Van Veen grab (0,1m²) - 5 replicates
per site and per season (total 2m² per site)
sieving: 2 mm mesh size
fixation: neutralized 4% formalin, 70% ethanol
~ counting and classification of macrofauna
~ taxonomic determination of Bivalvia

STATICAL ANALYSES:
univariate
multivariate
graphical

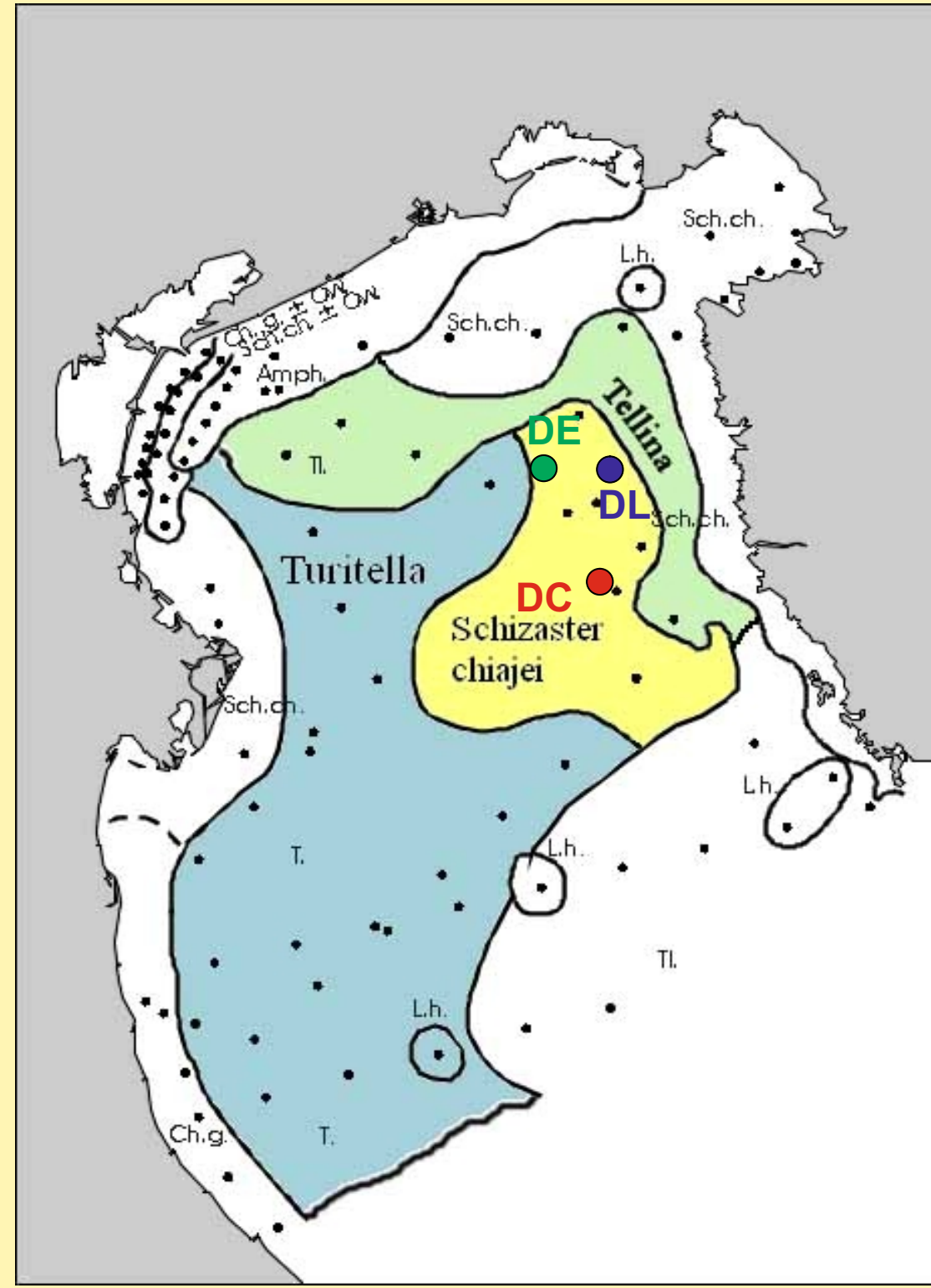


Fig. 2. Benthic zoocoenosis [3] and benthic biocoenosis [4].

RESULTS AND DISCUSSION

A total of 43 species, belonging to 33 genera and 24 families were identified. Faunistic composition were characterized by dominance of *Tellina donacina* and *Nucula nitidosa*, relatively high abundance (>5%) of 5-6 species and lower single participation of all other species (Fig.3.).

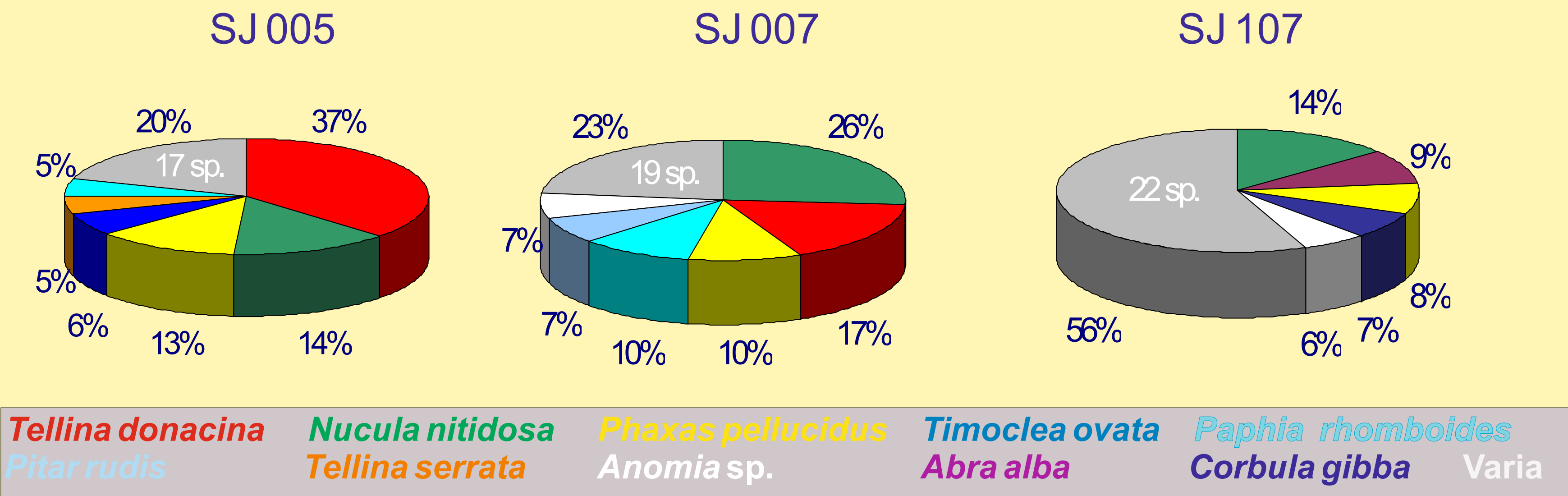


Fig. 3. Species composition and relative abundance of dominant (>5%) Bivalvia species.

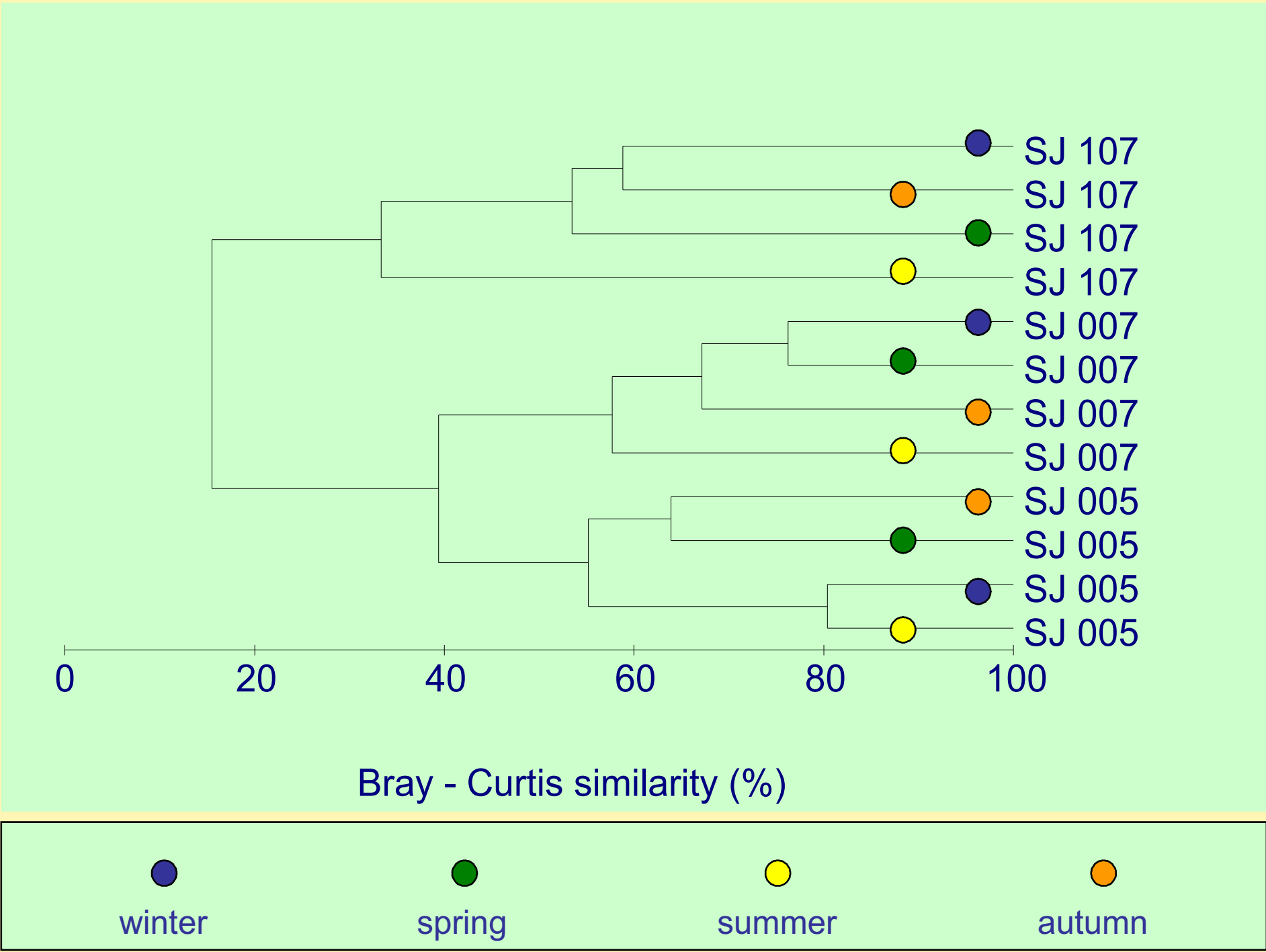


Fig. 4. Hierarchical classification of three sampling sites. The affinity level (based on Bivalvia composition) was expressed as % of faunistic similarity among sites.

Bray-Curtis similarity coefficients pointed out moderately high faunistic affinity between sampling sites ($Q_{SJ005:SJ107}=38\%$, $Q_{SJ005:SJ007}=57\%$, $Q_{SJ007:SJ107}=53\%$). Classification analysis based on similarity matrices clearly separated all three sites, suggesting higher faunistic affinity between SJ 005 and SJ 007 (Fig. 4.). The results of ANOSIM (global $R=0,762$; $T=999$, $p<0,1$) suggested differences in Bivalvia assemblages structure between SJ107 and two other sites ($R_{SJ005:SJ107}=0,969$, $R_{SJ007:SJ107}=0,938$), but no difference between SJ 005 and SJ 007 were found.

Mutual intersection of k-dominance curves belonging to particular seasons suggested the same trend of distribution of individuals per species suggested no differences in diversity pattern within sites (Fig. 5a, 5b i 5c). A general shape, position and elevation of k-dominance curves indicated higher diversity and evenness at SJ 107, related SJ 005 and SJ 007 (Fig. 5d).

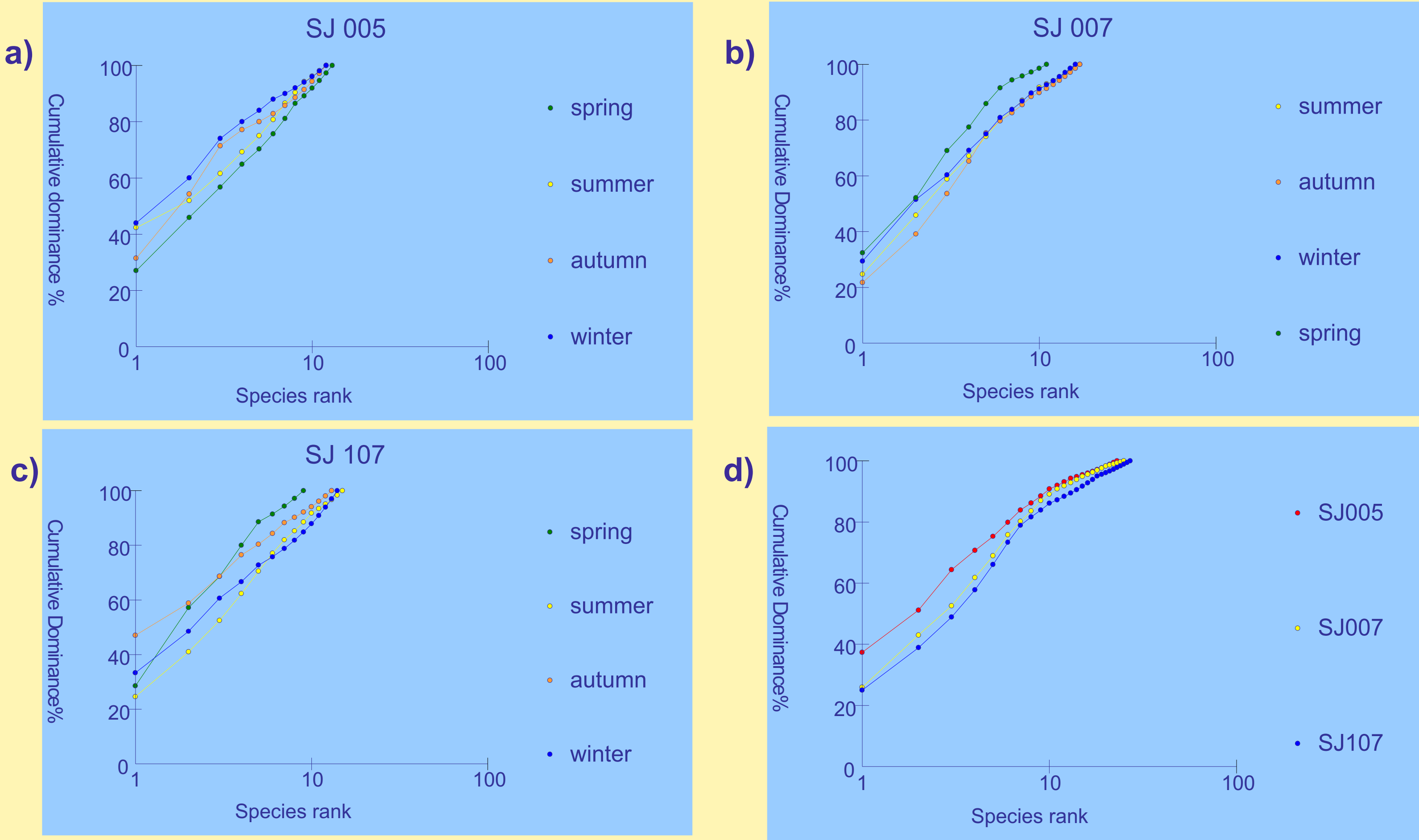


Fig. 5. k-dominance curves for Bivalvia assemblages: a) SJ005, b) SJ007, c) SJ107 and d) between sites.

In terms of Bivalvia assemblages structure the results of the SIMPER analysis indicated moderate to high average similarity within studied sites ($S_{SJ005}=64\%$, $S_{SJ007}=67\%$, $S_{SJ107}=45\%$), as well as dissimilarity between them ($\delta_{SJ005:SJ007}=49\%$, $\delta_{SJ005:SJ107}=74\%$, $\delta_{SJ007:SJ107}=71\%$), (Fig. 6.). Investigated sites characterized by very close indice values ($S_{SJ005}=23$, $S_{SJ007}=24$, $S_{SJ107}=27$; $N_{SJ005}=174$, $N_{SJ007}=293$, $N_{SJ107}=180$; $d_{SJ005}=4,26$, $d_{SJ007}=4,23$, $d_{SJ107}=5,01$; $H'_{SJ005}=3,18$, $H'_{SJ007}=3,52$, $H'_{SJ107}=3,68$; $J'_{SJ005}=0,70$, $J'_{SJ007}=0,76$, $J'_{SJ107}=0,77$) and from the univariate aspect did not differed significantly. The only exception was species abundance at SJ007 that was significantly higher (ANOVA, $p>0.05$) compared to other sites.

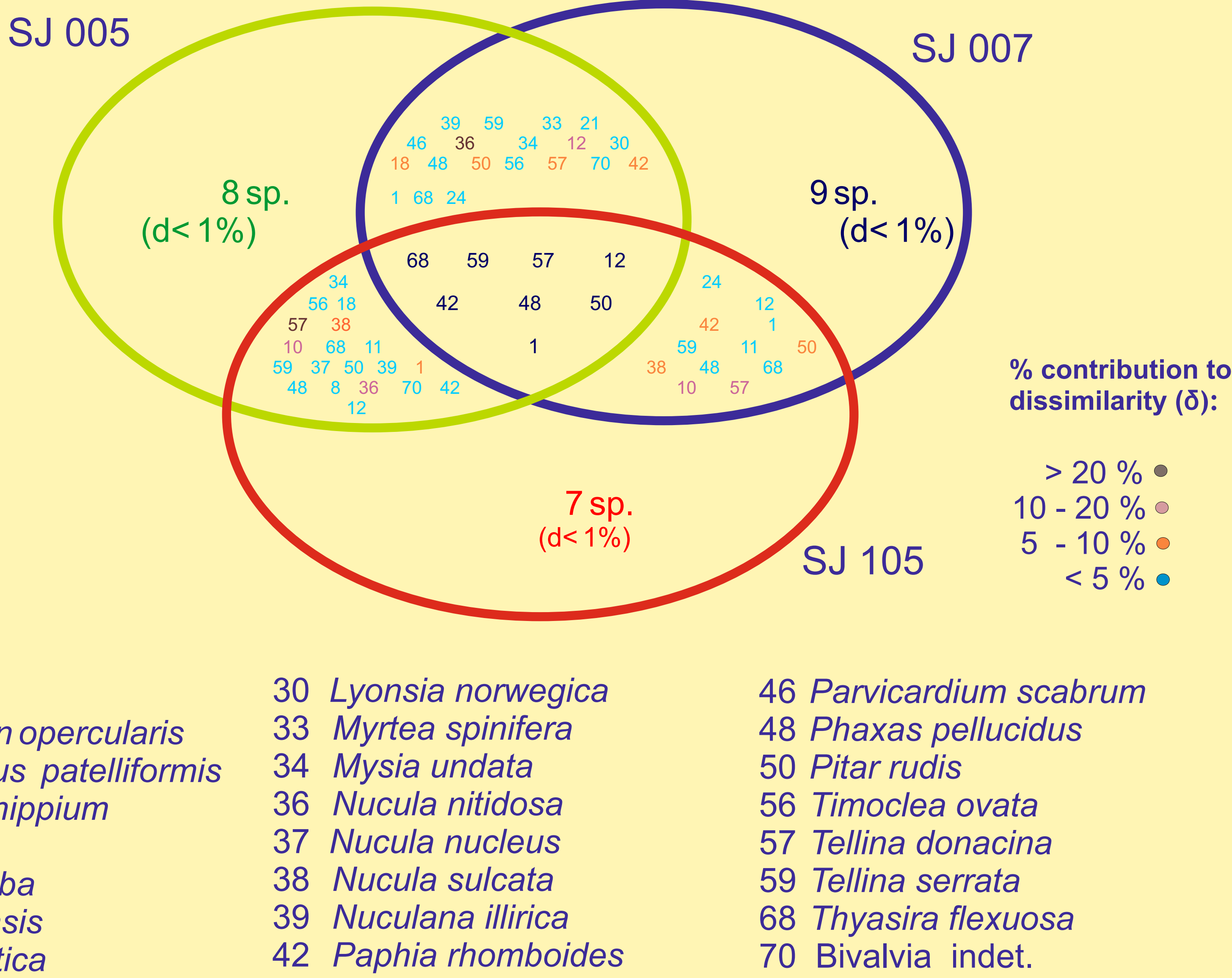


Fig. 6. The result of SIMPER analysis: characteristic species with average contribution to dissimilarity: > 20 % ●, 10 - 20 % ●, 5 - 10 % ●, < 5 % ●.

CONCLUSION

The structure of bivalves fauna was determined by distinctive dominance of families Nuculidae, Tellinidae and Veneridae; species *Tellina donacina* and *Nucula nitidosa*, outstanding position of 5-6 species (>5%) per site, and diversity ranged 23-27 species or 3,18-3,68 bits./ind. Compared with results of the previous investigations our results point out relatively high stability of Bivalvia assemblages and indicate resilience of benthic communities.

REFERENCES

1 - Zavodnik D., Travizi A., Jaklin A., 1993. MAP Tech.Rep.Ser. 78: 91-121, UNEP Athens 1994.
2 - Hrs-Brenko M., Medaković D., Labura Ž. and Zahtila E., 1994. Period. biol., 96: 455-458.
3 - Vatova A., 1949. Nova Thalassia, 1: 1-110
4 - Pérès J. M. and Picard J., 1964. Rec. Trav. Stat. Mar. Endoume, 31: 137 p.