

# CRUSTACEA AND ECHINODERMATA COMMUNITIES RESPONSE TO MARINE FISH FARM ORGANIC ENRICHMENT



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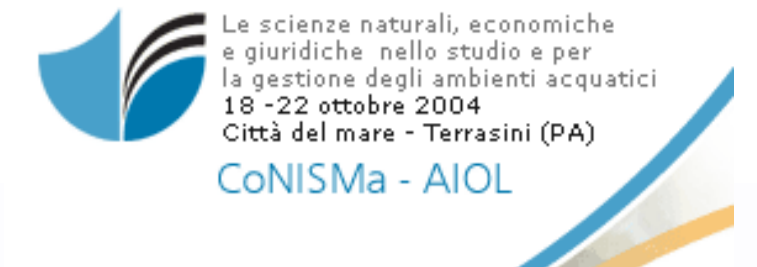


Fig.2- Fish farm sea cage (2000 m<sup>3</sup> each)



Fig.3- Sampling boxes



Fig.4- Sampling boxes retrieving with lifting balloon

## INTRODUCTION

The mariculture activities can produce some chemical sediment changes due to organic enrichment linked to uneaten food and excretions of bred species.

This change can perturbate the benthic community structure with biodiversity decrease and abundance increase of opportunist species adapted to this polluted environment.

This research studied the spatial and temporal effects produced by mariculture stock-farm on abundance and biodiversity of crustacea and echinodermata assemblages.

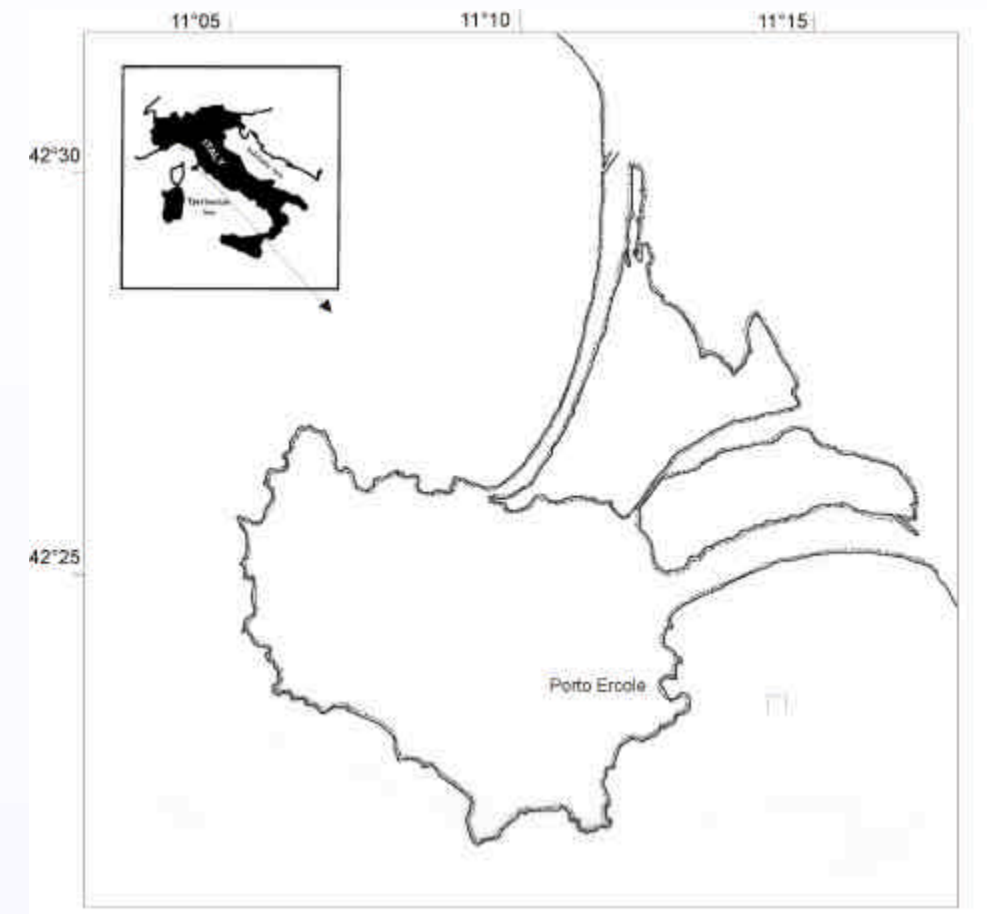


Fig.1- Fish farm location

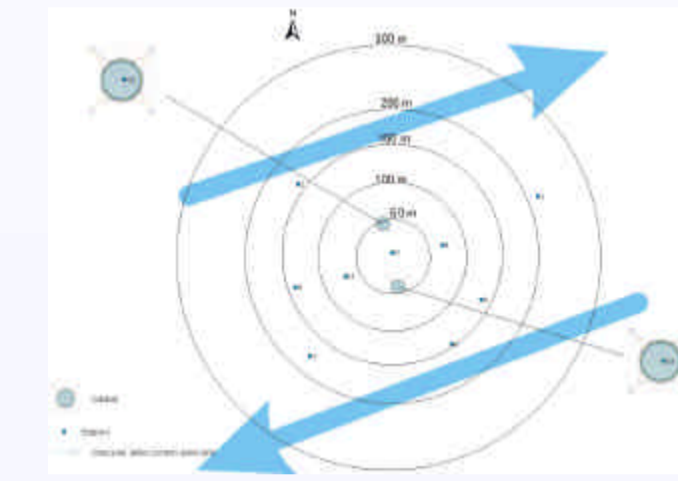


Fig.3 Sampling points in four surveys

## MATERIALS AND METHODS

The study was carried out in a fishfarm located in Tyrrhenian Sea (Italy), (Fig.1), where in two submergible cages (Fig.2) Shi drum (*Argyrosomus regium*) and sea bream (*Sparus aurata*) were bred (Tab.1).

Benthic samples were collected during four surveys: July 2001, December 2001, May 2002 and October 2002 (Fig.3). Two different sediment sampling methods were used: under the cages with boxes operated by scuba divers, and Van Veen grab for the samples taken far from the cages (Fig. 4 and 5). The macrobenthos samples were sieved *in situ* through a 500 µm mesh and the retained sediment containing organisms was preserved in 4% buffered formalin. Samples were sorted by hand into major taxa (Polychaeta, Mollusca, Crustacea, Echinodermata) and specimens were identified to species level.

The diversity and dominance index were calculated and the MDS analysis were performed with Bray-Curtis similarity (Warwick and Clarke, 2001).

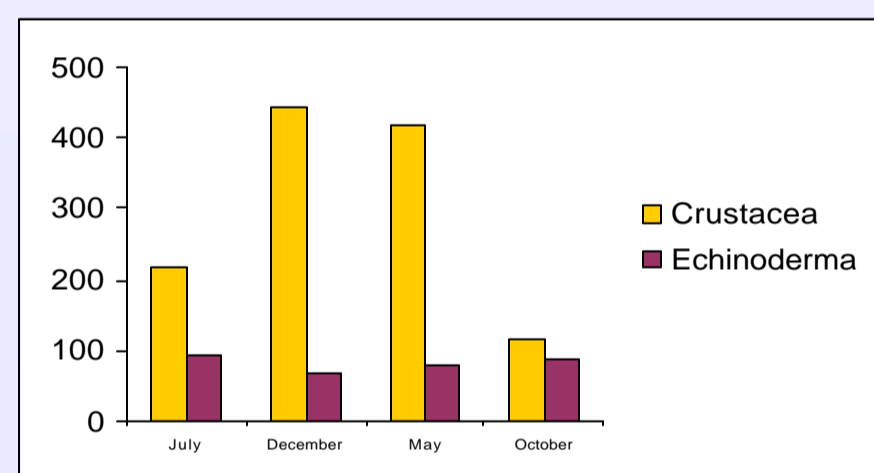


Fig.6- Crustacea and Echinodermata Abundance during four campaigns

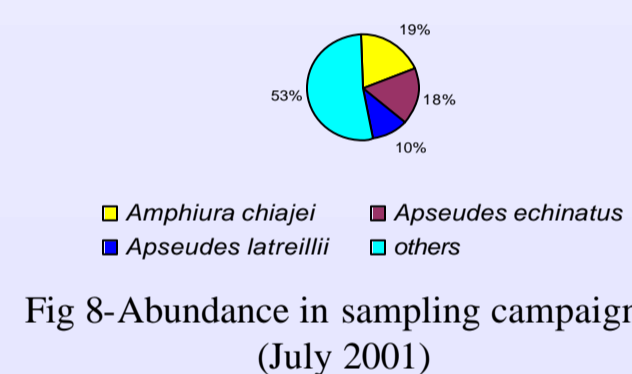


Fig.8- Abundance in sampling campaign (July 2001)

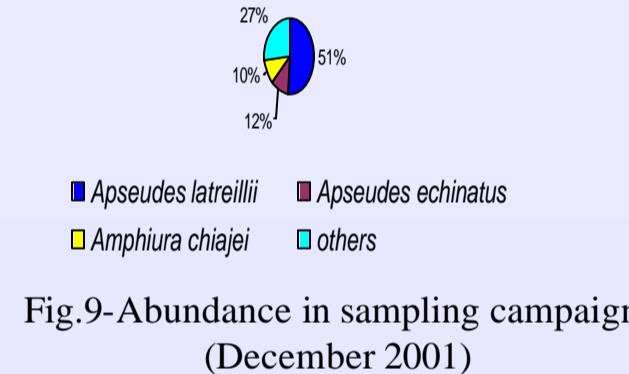


Fig.9- Abundance in sampling campaign (December 2001)

	G1	G2
July 01	0	12
Dec. 01	8	10
May 02	13	25
Oct. 02	25	26

Tab.1 Reared biomass in the sampling periods

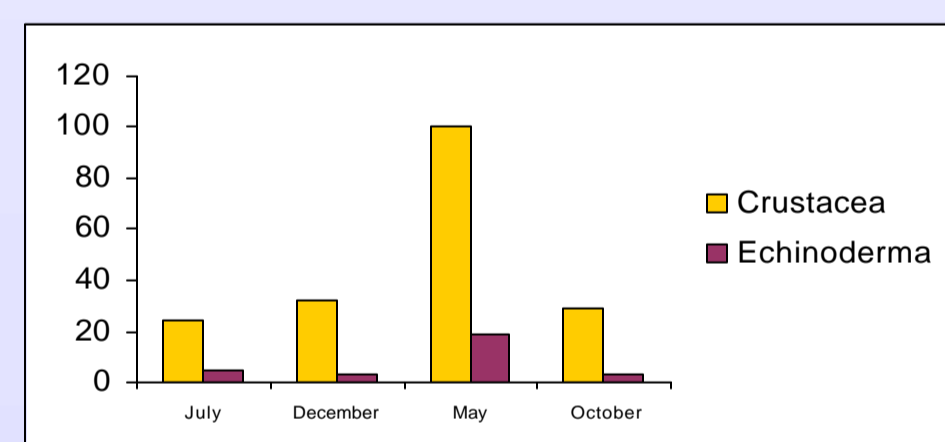


Fig.7- Species Abundance of Crustacea and Echinodermata during four campaigns

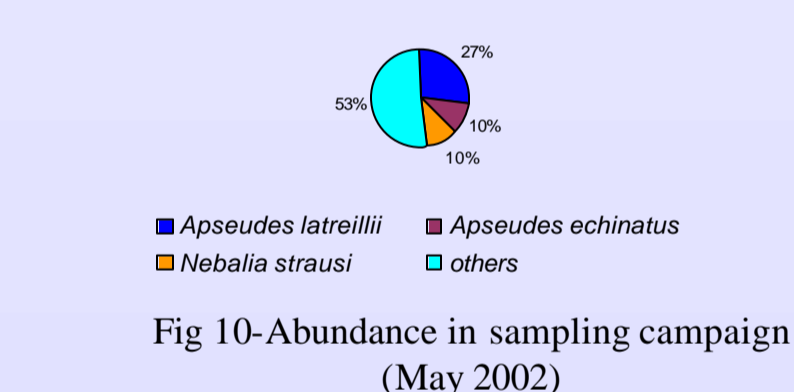


Fig.10- Abundance in sampling campaign (May 2002)

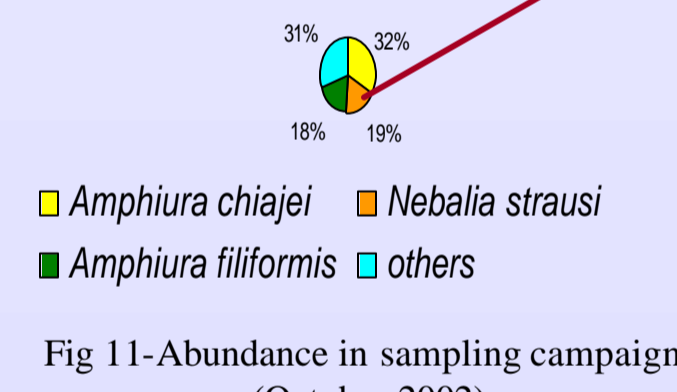
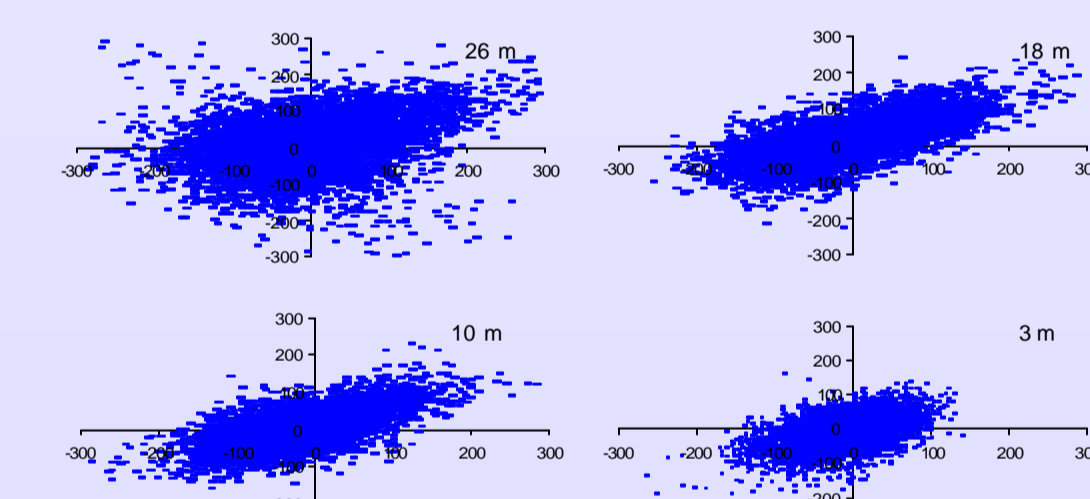


Fig.11- Abundance in sampling campaign (October 2002)



Fig.12- *Nebalia strausi*, found in G2 on May 2002, and in G1 on October 2002 with high presence. It was an opportunistic species and an indicator organic enrichment



Sea current velocity at four different water depth chosen among the 26 available (mm/s).

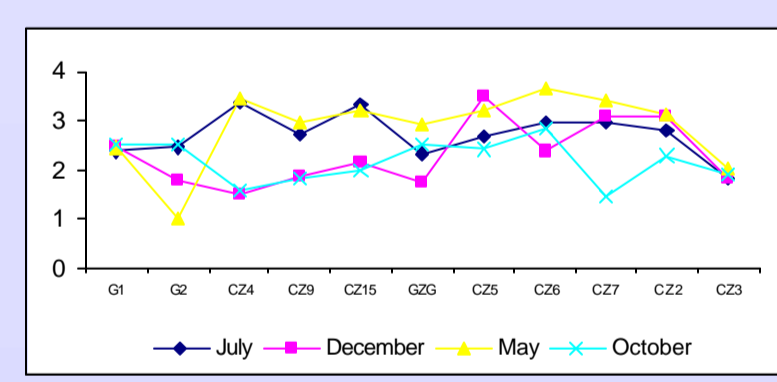


Fig. 12- The Diversity shows difference among G1, G2 and other sampling points.

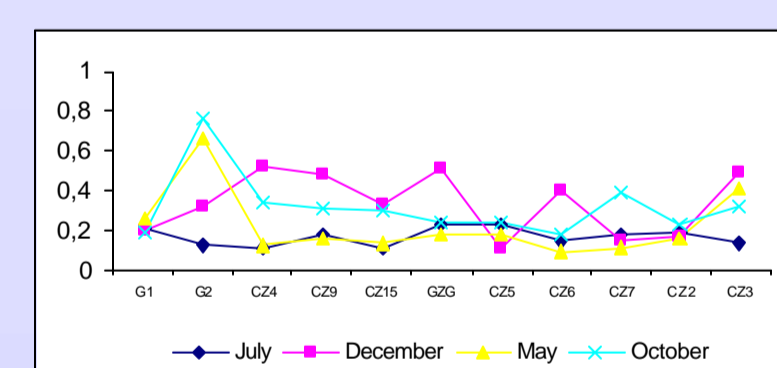


Fig. 13- The Dominance shows difference among G1, G2 and other sampling points.

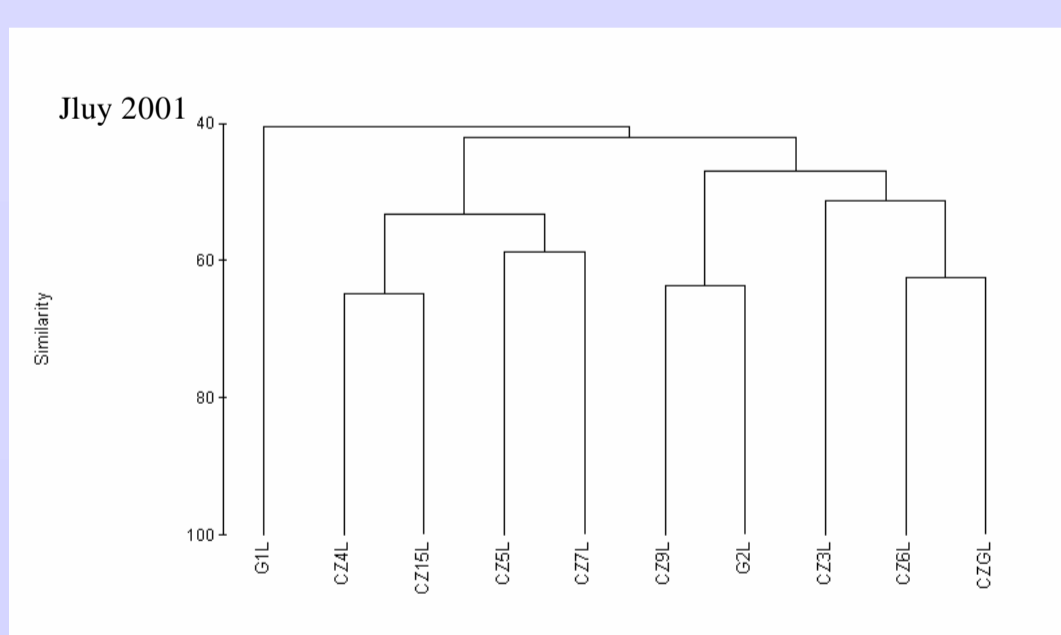


Fig.14- MDS plot showing no difference among sampling points

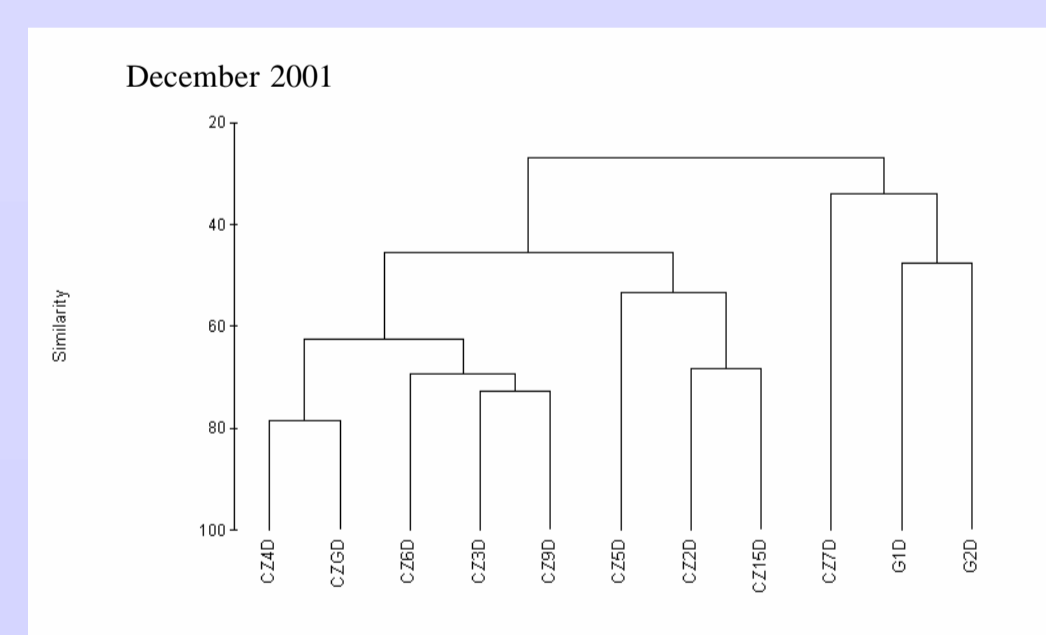


Fig.15- MDS plot, showing no clear difference among sampling points

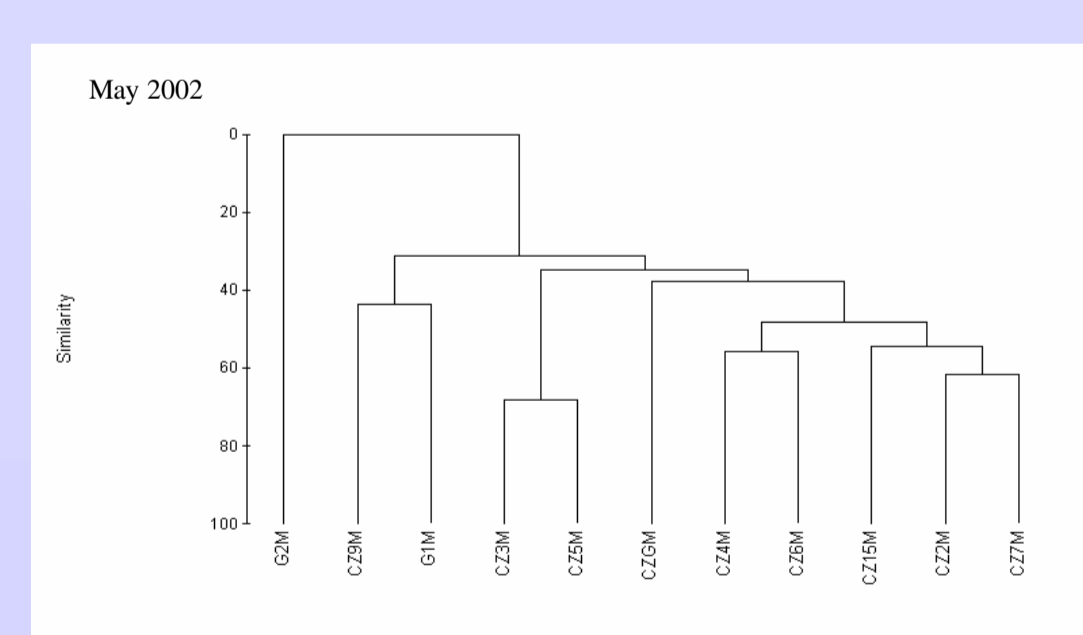


Fig.16- MDS plot, showing clear difference among G1 and the other sampling points.

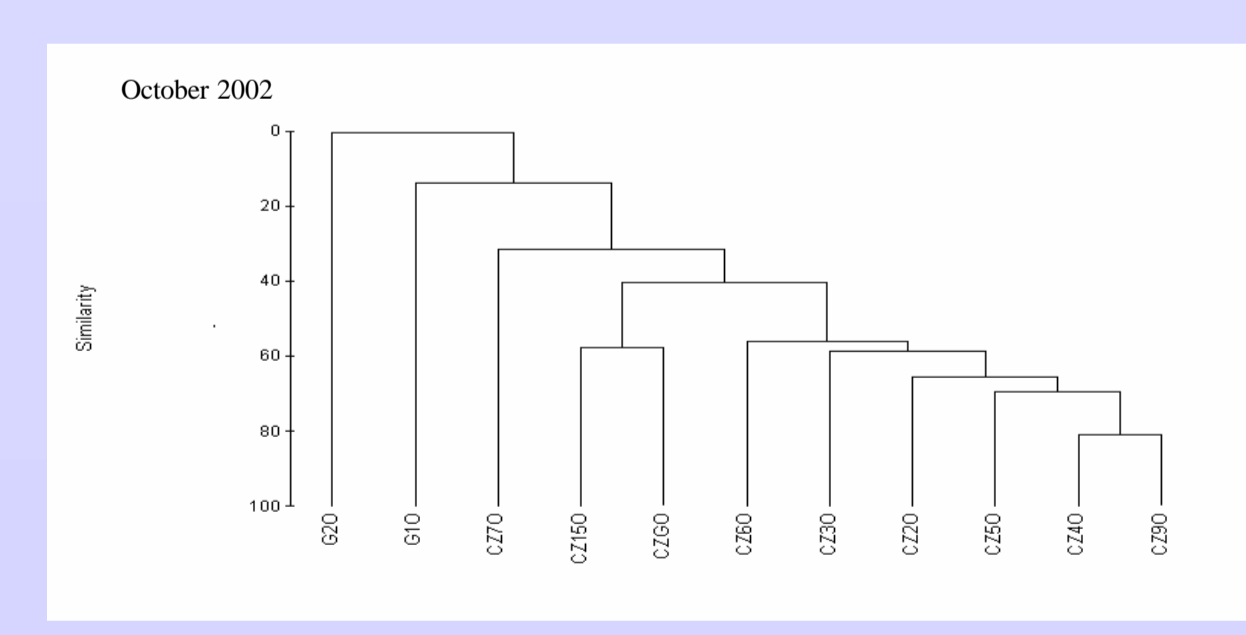


Fig.17- MDS plot, showing clear difference among G2 and the other sampling points.

## CONCLUSION

The fish farm activities produced environmental impact as organic enrichment of sediment. Respect to macrobenthos, this study showed a change in population assemblage in the stations just beneath the cages. Summarizing, The results showed:

- The lowest biomass values were recorded in July (2001) and the highest in May (2002);
- In all surveys (except in May 2002) the lowest abundance values were recorded in the stations under the cages;
- The stations under the cages showed less species than the other stations;
- There are no temporal variations due to seasonal cycle, but there are variations due to organic enrichment;
- In May and October 2002 under the cages was found *Nebalia strausi*, crustacea (Phyllocarida), with clear dominance (80% and 84% respectively). This specie is frequently associated with polychaete *Capitella capitata*, considered an indicator of communities influenced by high organic enrichment. In these environmental conditions *Nebalia strausi* grows and its abundance is probably due to low competition and to its physiological characteristics. These informations could designate *Nebalia strausi* as bioindicator of disturbed areas in Mediterranean sea.

## REFERENCES

- Clarke K.R., Warwick R. M. (1994) - Change in marine communities: an approach to statistical analysis interpretation, Plymouth: Plymouth Marine Laboratory, 144 pp.
- Pearson T. H., Rosenberg R. (1978) - Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. *Oceanogr. Mar. Biol. Ann. Rev.*, 16: 229-311.
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