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Relationships between Copepods– fish productions related to Algiers coasts (Bay of Bou Ismail)

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Introduction

Pelagic copepods are the majority component (more than 70%) within zooplankton biomass. Within the food web, they transfer organic matter from primary producers to higher trophic levels (Antajan et al., 2008). Therefore, changes in the abundance and composition of copepods can influence the abundance of fish stocks (Batchelder et al., 2012).

Material and methods

Copepod populations were sampled along the Bou Ismail bay (Algiers coasts – SW Mediterranean Sea) between 0-100 meters during a seasonal cycle (Fig. 1). Fish production of small pelagic comes from two ports: port of Bouharoun and port of Algiers.

To remove external salts, the zooplankton samples were rinsed with 6% ammonium formate, placed in an oven at a temperature of 70°C for 75 hours, then weighed to the hundredth of a milligram on an electro-balance.

In order to study the links between the biomass of copepods and the production of small pelagic, a correlation was carried out.

Figure 1. Geographic location of sampling areas

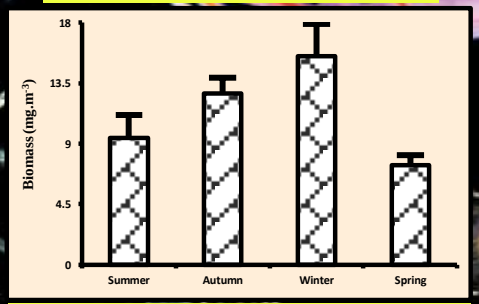

Figure 2. Seasonal variation of total dry biomass in Bou Ismail Bay

Results and discussion

A total of 62 taxa have been identified, belonging to 22 families and 37 genera. The most represented families are: Acartiidae, Aetideidae, Augaptilidae, Calanidae, Candaciidae, Centropagedae, Clausocalanedae, Corycaeidae, Eucalanidae, Euchaetidae, Heterorhabdidae, Metridinidae, Oithonidae, Oncaeidae, Paracalanidae, Phaennidae, Rhincalanidae, Sapphirinidae, Scolecitrichidae, Spinocalanidae, Subeucalanidae and Temoridae.

The average biomass is 11.26 mg.m^{-3} with seasonal fluctuations indicating spring oligotrophy (Fig. 2). Two quantitative gradients were observed; an increasing gradient from summer (9.44 ± 1.71 mg.m^{-3}) to winter (15.51 ± 2.40 mg.m^{-3}) followed by a decreasing gradient between winter and spring where we have recorded a minimum biomass of 7.38 ± 0.79 mg.m^{-3}. According to González et al. (2015), during winter periods, the size spectrum of zooplankton shifts towards large individuals. On the contrary, the warming of the water column promotes the reduction in the size of plankton (Moran et al., 2010) which induces a reduction in the biomass of copepods.

During summer, autumn and winter, small pelagic production is dominated by the Allache. The latter represents more than 50% of catches (more than 230 tonnes). In spring, catches are dominated by Allache and Saurel (45.7% and 46.8%, respectively). On the other hand, anchovy catches do not exceed 0.5% (2.5 tonnes) regardless of the harvesting season (Fig. 3).

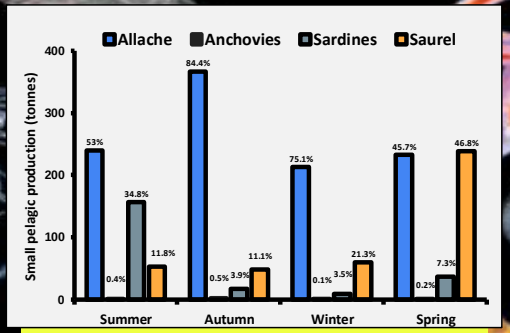

Figure 3. Seasonal variation in small pelagic production

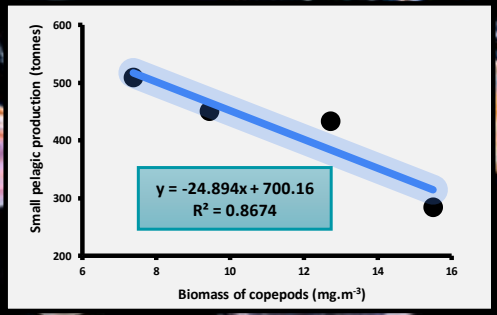

Figure 4. Representation of the correlation test (small pelagic production-copepod biomass)

The relationship between the biomasses of copepods and the production of small pelagic resulted in the following statistical model:

Production = -24.89 * Biomass + 700.16

This model is significant with a coefficient of determination **R = 0.867**, i.e. 86.7% of the variability in small pelagic production is explained by that of copepod biomass (Fig. 4).

Prey-predator associations play an important role in energy transfer to higher trophic levels (Benedetti et al., 2015). Consequently, changes in copepod abundance and biomass can influence fish stock abundance and fisheries management (Batchelder et al., 2012).

Conclusion & Perspectives

Quantitative levels of zooplankton biomass strongly affect the recruitment of fish of economic importance (small pelagic). Broadening studies on trophic interactions and the transfer of organic matter to higher trophic levels is essential for the conservation and good management of fisheries resources.

References

ANTAJAN, E., S. LELIEVRE, C. MARTIN, C. WAREMBOURG & S. VAZ, 2008. Mapping and modelling of winter ichthyoplankton distribution and associated zooplankton assemblages in the eastern English Channel and Southern North Sea. ICES WKZEM Report, 10: 38-39.

BATCHELDER, H. P., D. L. MACKAS & T. D. O'BRIEN, 2012. Spatial–temporal scales of synchrony in marine zooplankton biomass and abundance patterns: a world-wide comparison. Prog. Oceanogr., 97: 15-30.

BENEDETTI, F., S. GASPARINI & S. D. AYATA, 2015. Identifying copepod functional groups from species functional traits. J. Plankton Res., 38(1): 159-166.

GONZALEZ, C., R. ESCRIBANO & P. HIDALGO, 2015. Intra-seasonal variation of upwelling and its effects on copepod community structure off central/southern Chile (2002–2009). Hydrobiologia, 1-14.

MORAN, X. A. G., A. LÓPEZ-URRUTIA, A. CALVO-DÍAZ & W. K. LI, 2010. Increasing importance of small phytoplankton in a warmer ocean. Global Change Biol., 16(3): 1137-1144.