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THE SEASON DYNAMICS OF MEIOBENTHOS ON THE COLLECTORS OF MUSSEL FARM IN THE BLACK SEA NEAR THE CRIMEAN WESTERN COAST

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INTRODUCTION

There are several size-ecological groupings in natural and cultured bentic communities: macro-, meio- and microzoobenthos. These groupings present functional unity, despite different rates of substance and energy transformation and definite character of reaction to the cenotic environment changes (Galtsova, 1991).

Intensive studies of the fouling communities on artificial substrates in the Black Sea Ukrainian aquatorium began in the second half of XX-th century. Fixed foulers were the objects of investigations in the early works. Parallel to this, researchers registered high numbers of motile macrofauna organisms, pointing to their negligible role (Dolgopolskaya, 1954; Zevina, 1972). Possibly such low estimation of the unfixed role of macroorganisms in the fouling communities was conditioned by an actual problem – protection of industrial objects against macrofouling.

In the early studies of the fouling communities, the category of meiobentos was not considered. In 1985 there appeared work on zoofouling in natural biotopes and on artificial substrates (metal and glass plates), in which they mentioned the presence of some meiobentic groups (Braiko, 1985). With the purpose of determining stability of fouling materials, they conducted complex experiments, studying formation of fouling on the samples of different artificial substrates (concrete, granite, rubber, lime-stone) in the north-western part of the Black Sea in 1996. The initial studies of the formation of meiobentic fouling communities were part of these investigations (Vorobjeva, 1996). Earlier they did not carry out studies of meiobentic community formation on artificial substrates under aquaculture conditions in the Black Sea.

Taking into consideration previously obtained experimental data on edificating role of mussels in communities formation (Kiseleva, 1979; Sergeeva, 1985) we tried to trace meiobenthos development in the mussel fouling community.

MATERIALS AND METHODS

Collectors for growing mussels were installed in the Karantinnaya Bay (Sevastopol region) in April 2003. The depth of the studied region was 10 m. Collectors, made of synthetic nets 5 m high, was positioned 20 m from the shore. Monthly sampling of collector's fragments from three horizons (0, 3 and 5 m) began 2.5 months after the collectors were mounted. Mussel habitations were already registered on collectors. In August, January and May they did not take samples due to stormy weather. The methods of meiobentic sample processing is given in (Lysykh, 2005). The number of organisms in a sample was counted for m2 of the artificial collector surface.

RESULTS AND DISCUSSION

Representatives of nineteen main taxa were registered in the meiobenthos composition. Eumeiobenthos included: Foraminifera, Turbellaria (partially), Nematoda, Kinorhyncha, Polychaeta (partially), Harpacticoida, Ostracoda, Acarina, Tardigrada. Pseudomeiobenthos (juveniles of macrozoobenthos) was represented: Nemertini, Oligochaeta, Polychaeta, Chitonida, Gastropoda, Bivalvia, Cirripedia, Decapoda, Amphipoda, Pantopoda, Chironomidae. Presence of

Foraminifera and Tardigrada not registered earlier in fouling communities of the Black Sea Crimean aquatorium was a peculiarity of the given meiobenthos taxonomic structure.

Average yearly population density of meiobenthos habitation at 0, 3 and 5 m was correspondingly: 1434×103±527846 ind.*m^2, 1291×103±297036 ind.*m^2 и 1482×103±863885 ind.*m^2. Contribution of every taxon into general density of meiobenthos habitation was not equal.

On the collector studied horizons, two peaks of meiofauna habitation density were revealed. The first peak, timed to September at all the horizons, was conditioned by sedimentation of Mytilaster lineatus larvae, the share of which in general community abundance was equal (72-74%). The second peak of meiobenthos abundance at the upper horizon in June 2004 and at the middle and lower horizons in March 2004 was caused by the mass development of nematode.

Eumeiobenthos made the main contribution of the general meiofauna abundance. That's why below the most mass groups of eumeiobenthos were considered. Nematods were the dominating taxon in number; harpacticoids were subdominated. Acarins and ostracods were characterised with considerable density of habitation (Table 1).

Table.1. Average yearly population density (ind. · m^{-2}) of main taxa of meiobenthos on the collectors of mussel farms.

Taxon	Depth, m		
	0	3	5
Nematoda	635108±277945	622487±223573	676881±307989
Harpacticoida	284156±115282*	258557±115523	252877±146893
Acarina	47631±37107	21832±10997	16763±9592
Ostracoda	19693±24260	25268±10607	24204±15667

*excluding nauplia

HARPACTICOIDA

Development of Harpacticoida was a clearly expressed seasonal character at all horizons. Maximum indices of harpacticoids habitation density were marked in summer and early autumn seasons 2003-2004 (Figure 1). They coincided with a period of development of macrophytes and hydroids, which represent usual habitat environment and nutrition sources for harpacticoids (sporangia of algae, microphytobenthos). Contribution of harpacticoids to the general meiobenthos abundance varied during the year from 6 to 51%.

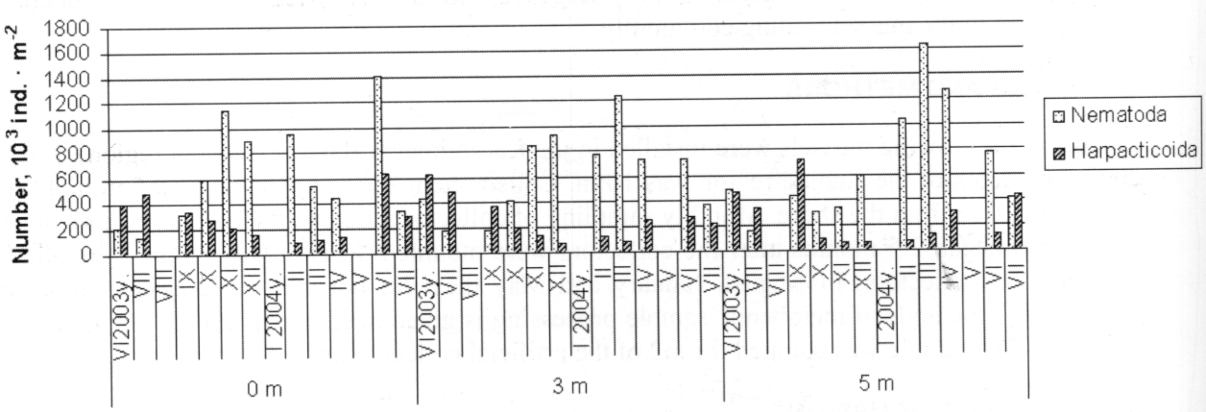

Figure 1. Seasonal development of dominant taxa Harpacticoida and Nematoda.

NEMATODA

Nematods dominated the community at all the depths from October 2003 (Figure 1). Possibly this was facilitated by the wide nutrition spectrum of these animals and food abundance on collectors, such as microorganisms and detritus, accumulated between stable bissus threads of mussels. The share of nematode changes from 7 to 85% in general meiofauna abundance.

ACARINA

The mass growth of marine mites took place at the first months of the community formation. Possibly such peculiarity in development of this phytophylic group of animals was connected with good algae development on substrate, free of dense mussels habitats. A Acarina development peak (July - 205×103 ind.*m-2) was characteristic for 0 m. Maximum indices of this group abundance at the middle and lower collector horizons were registered in July - 60×103 ind.*m-2 and September - 56×103 ind.*m-2. There was strict tendency of a decrease in average yearly population density with inhabitation depth in mites development. The highest contribution of this group to the general meiobenthos abundance reached 18%.

OSTRACODA

Maximum and minimum magnitudes of ostracods population density were characteristic for 0 m. Their mass development - 125×103 ind.*m-2 at this horizon was observed in October; in March ostracodes were absent in the community. Density of this taxon habitation increased in March 2004 for 3 m and reached 60×103 ind.*m-2. Two peaks of Ostracoda development were registered at 5 m in September 2003 - 67×103 ind.*m-2 and in April - 61×103 ind.*m-2. The highest contribution of this taxon to the general meiofauna abundance was 8%.

The dynamics of habitation density and meiobenthos structure we revealed obviously was conditioned by characteristic for every taxon life cycles, connected with the season changes in the environment abiotic factors and biocenological interrelations in the fouling community. Mussel, being important representatives of fouling, changes habitat of the accompanying fauna and forms community trophic structure (Galtsova *et al.*, 1985). Abundance of feeding resources and good topical conditions formed on mussel collectors promoted formation of the meiobenthos communities with high abundance and rich taxonomic diversity.

CONCLUSIONS

At the initial formation period of the mussel aquaculture community meiobenthos had high population density and great taxonomic diversity (19 main taxa).

Average yearly population densities of meiobenthos were $1434\times10^3\pm527846$ ind.8m^{-2}, $1291\times10^3\pm297036$ ind.*m^{-2} и $1482\times10^3\pm863885$ ind.*m^{-2} at 0, 3 and 5 m of mussel collectors respectively.

Eumeiobenthos was the main contributor to the general meiofauna abundance.

Nematoda was dominant taxon at the depths studied.

Growth of Harpacticoida had evident seasonal character at all the collector horizons.

Mass growth of Acarina was at the first months of the community formation.

Maximum and minimum population densities of Ostracoda were on the top horizon of the mussel collectors.

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