Cercetări Marine	I.R.C.M.	Nr.10	211 - 216	1977

MUSSELS ACTIVITY IN MICROBIAL CLEANING OF MARINE COASTAL WATERS

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ABSTRACT:

The paper presents the results of the experiments aimed to point out the place taken by mussels in the bacterian purifying process of marine water by retaining the faecal microorganisms.

It is well known that filtrating organisms retain for their food, in the same time with small particles, the faecal microorganisms too. The retaining rate by Mytilus galloprovincialis, the most important constituent of the Black Sea biofilter, is not known yet.

This paper presents the results of laboratory tests performed with the purpose to point out the rhythm of retaining under controllable conditions.

Previously to the laboratory experiments the filtration rate of mussels on length classes was studied (3). The maximum filtration rate belongs to the 51-60 mm class.

MATERIAL AND METHOD

Mussels belonging to 51-60 mm and 61-70 mm length classes were used.

The organisms were sampled from a coastal area under the influence of a domestic wastes discharge. In the experiment, the mussels were kept in 6o l tanks with sea water; the physico-chemical and bacteriological parameters of water were similar to the natural habitat area. In each tank 25 mussels were introduced.

The experiments were performed in 2 series. In both experiments, water temperature was 2o-22°C and disolved oxygen provided by air bubbling varied between 8.1-9.o mg/l. In the first experiment the salinity was 13.85 g‰ while in the second one 14.29 mg‰.

All those parameters fit to the normal variation of the Romanian Black Sea coasts.

In both experiments a control tank with sea water of the same parameters but without mussels was set.

Mussels activity was pointed out by following the principal indicators of faecal pollution - total coliforms (CT), faecal coliforms (CF) and faecal streptococcus (SF). Those countings, were performed before the test started and then from 24 to 24 hours in the control as well as in the experimental tanks.

The multiple tube method was used the results being expressed in MPN/l.

RESULTS AND DISCUSSIONS

The initial microbial load in the first series was $16.1o^4$CT/l, $41.1o^2$CF/l, $4.1o^3$SF/l. In the second experiment the initial microbiol load was $13.1o^3$- $17.1o^3$CT/l, $76.1o^3$- $79.1o^3$CF/l and $32.1o^2$- $39.1o^2$SF/l.

During the experiments a lowering of the followed parameters was noticed, both in the control and experimental tanks.

The shape of curves from fig. 1-6 shows that for each experiment and parameter the lowering rate of values was much higher in the tanks with mussels than in the control. In the control tanks a slight decreasing of the parameters values was noticed too, as a result of the natural mortality of microorganisms induced by the viability time specific to each analised group.

From the same curves, it can be noticed that the 51-6o mm length class mussels are more efficient in microorganism retaining than the 61-7o mm class. This is correlated with previous data (3)

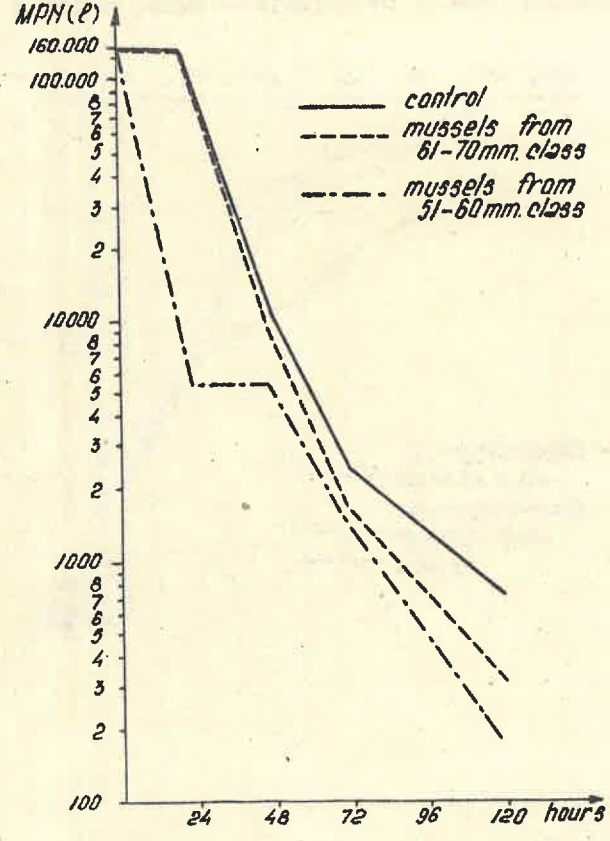

Fig. 1 - Time variation of total coliforms - 1st experiment

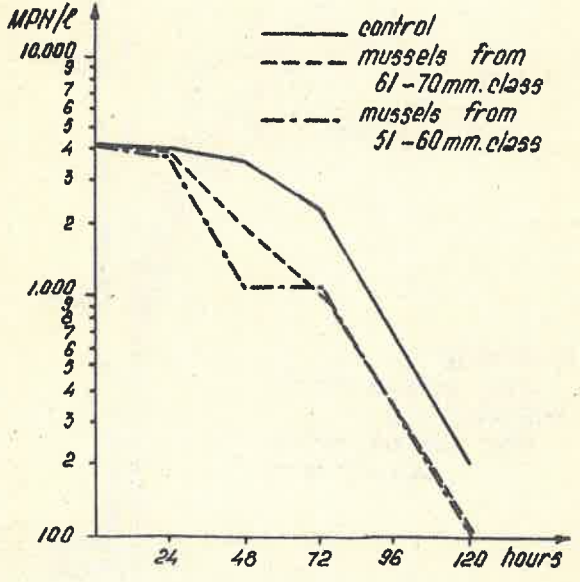

Fig.2 - Time variation of faecal coliforms - 1st experiment.

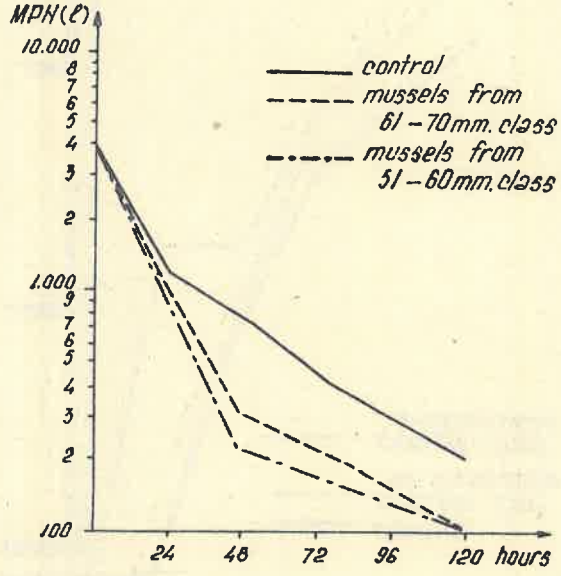

Fig.3 - Time variation of faecal streptococi - 1st experiment.

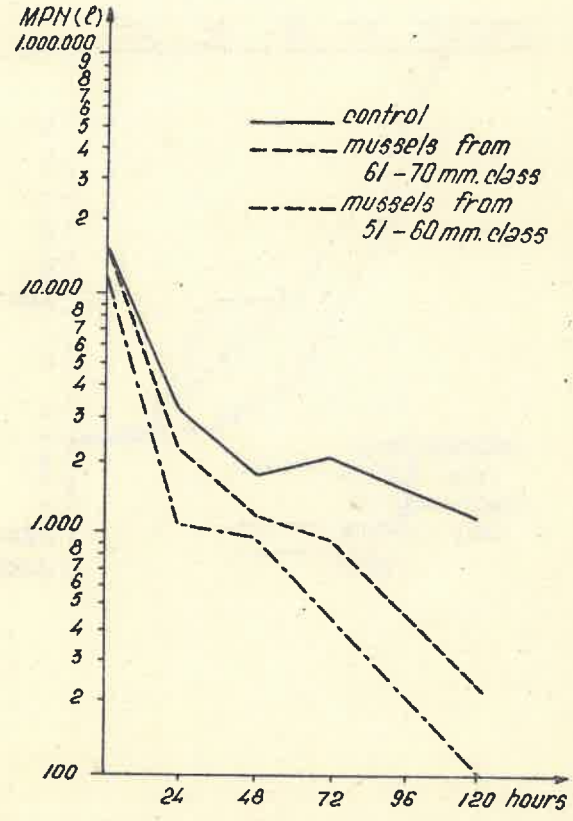

Fig.4 - Time variation of total coliforms - 2nd experiment.

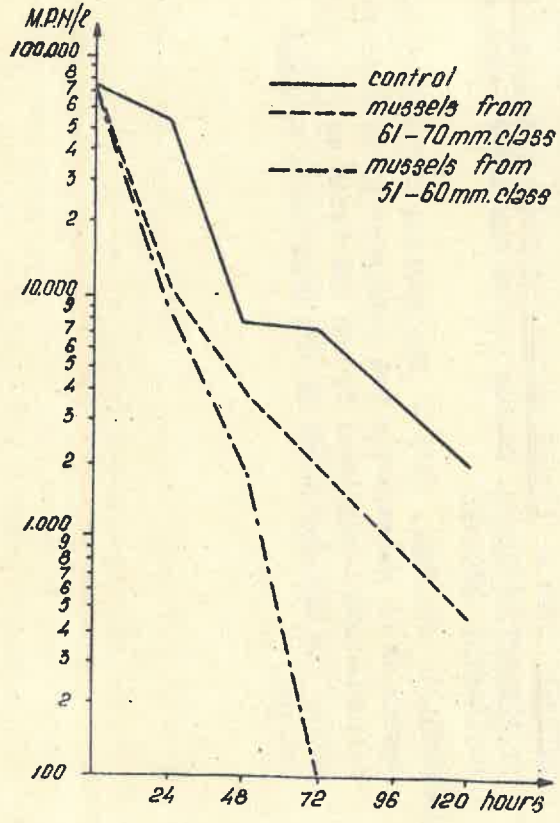

Fig.5 - Time variation of faecal califorms - 2nd experiment

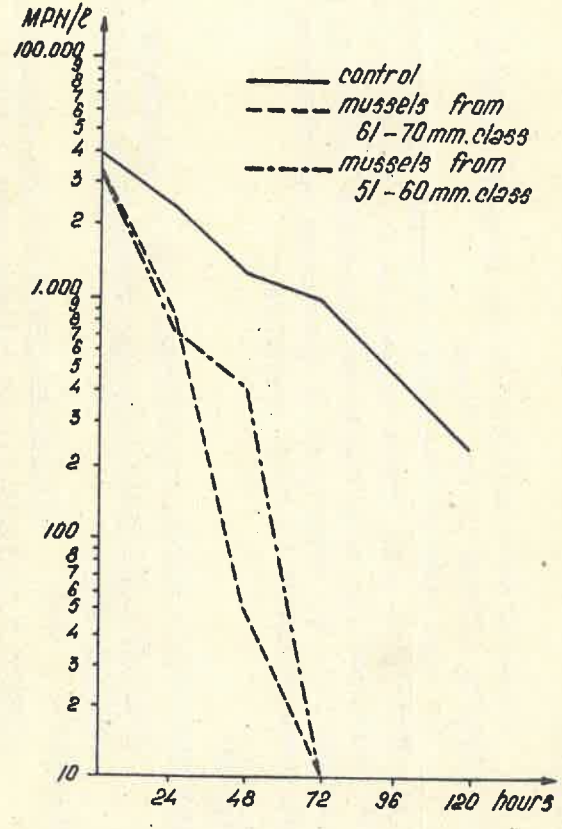

Fig.6 - Time variation of faecal streptococci - 2nd experiment

which show for this class a higher filtration rate.

CONCLUSIONS

Presented data materialize the mussels activity in bacterial cleaning process of sea water.

The high rate of decreasing of faecal microorganisms from the mussel populated tanks emphasizes the importance of the natural biofilter for maintaining the sea water quality. It shows at the some time the importance of protecting and extending the bottom areas populated by these organisms.

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