Is it possible to decrease Effluent contaminations by aquatic molluses?

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Abstract

Zebra mussel Dreissena polymorpha is a bivalve species native to the Caspian sea belonging to filter feeder class of gastropods which can filter organic and inorganic materials in water. We studied the capability of the mussel in reducing concentration of nitrate and phosphate in urban wastewater. The shell masses 20, 40 and 60 grams each were tested for filtration and indirect absorption of nitrate and phosphate from artificial wastewater. The tests were performed in open and closed systems and were repeated 3-10 times depending on the changes observed in the variance range. We found a positive correlation between the weight of shell masses and the filtration rate of nitrate and phosphate in open and closed systems. Also, we observed a negative correlation between the concentration of nitrate and phosphate in wastewater and the filtration capability of the mussels. When the mean concentration of nitrate and phosphate was reduced in wastewater inlet and outlet, the filtration rate by mussels increased.

We found that with increase in mussels' dry weight unit in the open system, nitrate absorption changed in the range 0.08 - 0.2 mg/l, while phosphate absorption was in the range 0.02 - 0.04 mg/l. The absorption ranges for nitrate and phosphate in the closed system were 0.03 - 0.11 mg/l and 0.01-0.02 mg/l respectively. The result shows that the efficiency of the mussels in removing nitrate and especially phosphate in the closed system is low compared to the open system. Hence, the capability of D. polymorpha in reducing nitrate and phosphate being not more than 20 percent, we would not recommend it for urban wastewater treatment.

Keywords: Dreissena polymorpha, Zebra mussel, Urban wastewater, Nitratre, Phosphate, Treatment