Coastal and marine ecosystems, biology and ecology

Study On The Mortality And Behavior Of Manila Clam During Blue Tide

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On October 26, 2009, blue tide was observed in the north coast of Osaka Bay. In this time, it was observed many Manila clam (Ruditapes philippinarum) extended their neck and pelecypod in the sea. On the following day, Manila clam mass mortality was observed on the tidal flat. Several studies have shown the tolerance of the Manila clams to anoxic conditions or increased hydrogen sulfide levels during blue tide. However, data on the abnormal behavior of Manila clam during blue tide has not been studied in detail. Here, we studied the abnormal behavior and energy consumption of Manila clam to understand mortality because of hypoxia during blue tide. We conducted experiments using 480 Manila clams under varying dissolved oxygen (DO) and hydrogen sulfide concentrations to evaluate the effect on mortality, behavior, and energy consumption. The following results were obtained; (1) A correlation was observed between the shell closing time and survival; (2) After exposure to anaerobic condition for 24 hours in hypoxic water, Manila clam opened their shells and extended their neck and pelecypod on the anaerobic conditions. Manila clam consumed more energy by these behavior in open their shells. Thus, the decreasing energy consumption, the decreasing survival rate; (3) The clearance rate was observed to reduce when the extended neck and pelecypod came into contact with hydrogen sulfide in the hypoxic water; (4) Variations in the hydrogen sulfide levels (H2S 10 mg/L, 2mg/L) after hypoxia increased Manila clam mortality and; (5) 6 distinct behavioral patterns were observed before clam death because of hypoxic conditions and excess hydrogen sulfide levels in sea water. By assessing the inner region of the Osaka

Bay, we consider that the hypoxic condition occurred much before the blue tide. Moreover, Manila clam use their stored energies during the summer season. Therefore, it is possible that the stored energies of the Manila clams had already decreased before the occurrence of the blue tide. Additionally, the impaired clearance rates of the Manila clams occurred because of excess hydrogen sulfide levels. Thus, we concluded that Manila clam mass mortality can be prevented if the stored energy is raised effectively.
Keywords: Blue tide, Ruditapes philippinarum, behavior, mortality, glycogen