Title : DO-increasing effects of a microscopic bubble generating system in a fish farm.

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Abstract : We installed a "Microscopic-Bubble Generating System for the fish farm" developed for fish farming in a red sea bream fish farm established in Kusuura Bay, Kumamoto Prefecture, Japan. A microscopic bubble generator was set at 7 m in depth at the center of each of four net pens, and released microscopic bubbles with 5 liter/min. of air-flow rate from July 6 to December 9, 2004. This system worked for 15 hours per day from the evening to the next morning, everyday, except during periods when a typhoon approached the study area. Total operation time was 1,557 hours. In order to evaluate the efficiency of "the microscopic bubble generating system" to increase the dissolved oxygen concentration (DO), we investigated the vertical profiles of DO, temperature, current velocity and current direction, at 32 stations around the net pens with microscopic-bubble generators installed. The results revealed that DO concentration of bubbling net pens increased and became significantly higher than the level outside the net pen (between 0.52 and 0.87 mg/L, and the whole water column was nearly saturated. Temperatures of the bubbling net pens decreased slightly between 0.08 and 0.12 $^{\circ}$ C in all the layers. Furthermore, microscopic-bubbles seemed to reach the deeper water due to the downward flow and diffusion. This study demonstrated that the microscopic bubble generating system developed in our research project could increase efficiently the ability the dissolved oxygen concentration throughout all water layers of the fish farm.

Key words: dissolved oxygen, environmental management, fish farm, microscopic bubble, microscopic bubble generating system

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