

Water quality remediation using geotextile in fish hatchery systems

Abstract

This study was designed to use Aquamat™ in the daily exchange and flow-through culture systems of fish hatchery for improving the quality of seawater. Aquamat™ is a commercial innovative product fabricated from highly specialized synthetic polymers that forms a three dimensional structure. Results showed that the Aquamat™ reduced ammonia (NH₃-N), total suspended solids (TSS) and dissolved oxygen (DO) concentrations in the daily exchange system but not in the flow-through system. Average values of NH₃-N (F=0.028; t=-2.006; P=0.047), TSS (F=4.550; t=-2.787; P=0.006) and DO (F=25.085; t=-2.833; P=0.005) concentrations were significantly lower in the culture tank with Aquamat™ than the culture tank without Aquamat™. Fish biomass gain was significantly higher (F=2.177; t=-4.296; P=0.001) in the culture tanks of with Aquamat™ than without Aquamat™. The bacterial density was significantly higher (F=11.437; df=2; P=0.000) on the surface of Aquamat™ than in the seawater of culture tanks with and without Aquamat™. This study suggests that the Aquamat™ provides surface area for fish to hide from cannibalism activity, thereby reducing mortality. It was also found that the extra feeds and fish wastes attached to the surface of Aquamat™, reduced TSS concentration in the water with culture system. The surface of Aquamat™ also provided places for microbes to grow and increased the nitrification process. The nitrification processes converted NH₃-N to NO₂-N then NO₃-N with help from nitrifier bacteria and DO concentrations, which reduced NH₃-N toxicity in the culture system. However, result also showed that the Aquamat™ increased the NO₂-N and NO₃-N concentrations in the culture system. This study suggests that the Aquamat™ is still not capable of eliminating the entire amount of dissolved inorganic nitrogen in the culture system for water quality management in a fish hatchery system.