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Performance comparison between locally developed aerators and its effects on catfish effluent

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Catfish production is one of the largest segments of fish culture in Nigeria. However, catfish effluents, which usually pollute the environment, need to be controlled. The study was to compare the effectiveness of the two aerators in term of dissolved oxygen and reduction of concentration of catfish effluent. The volume of catfish effluent was collected into two basins (A and B) and diluted at given ratios. The paddle-wheel and spiral aerators were installed in the basins respectively. Aerators performance evaluation was conducted using unsteady state test. Physicochemical properties of water sampled from the tested ponds were determined in accordance with the American Public Health Association standards. For paddle-wheel aerator at 2 m^3 or less volume, the prototype machine provided adequate supply and uniform and equal distribution and mixing of dissolved oxygen in the system at 2 m^3 to 5 m^3 supplied and provide mixing of dissolved oxygen at non-uniformity of dissolved oxygen in entire volume. At pond water volume above 5 m^3, dead zones and oxygen stratification occurred. While for spiral aerator at 3 m^3 or less volume of water, the prototype machine developed provided adequate supply and uniform and equal distribution and mixing of dissolved oxygen in the system; at 3 m^3 to 6 m^3 supplied and provide mixing of dissolved oxygen at non-uniformity of dissolved oxygen in entire volume. At pond water volume above 6 m^3, dead zones and oxygen stratification occurred. The results indicated that spiral aerator performed better than paddle-wheel aerator because it achieved higher overall oxygen-transfer coefficient, standard oxygen transfer rate and standard aerator efficiency at the same volume of water, speed, power and depth of operation; it also performed better than paddle-wheel aerator on catfish effluent reduction in the same environmental conditions. Hence, blade configuration is the main factor responsible to difference in their performance.

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