Comparative Performance of Surface and Gravity Aerators for Application in Aquaculture

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Abstract—*Aerators are the devices used in aquaculture systems to supply oxygen to water body for increasing fish production. increase productivity. Various aerators are used to meet the requirement of aquaculture. In this study six different types of aerators; paddle wheel aerator, spiral aerator, perforated tray aerator, propeller-aspirator-pump aerator, circular stepped cascade aerator and pooled circular stepped cascade aerator were selected to evaluate their efficiency in terms of standard aeration efficiency. Aeration experiments were conducted in two cement concrete tanks of dimensions 4 m × 4 m × 1.5 m and 5 m × 5 m × 1.5 m. The maximum standard aeration efficiency of 1.65 kg O_2/kWh was obtained for a single hub paddle wheel aerator. For spiral aerator, the maximum standard aeration efficiency obtained was 1.00 kg O_2/kWh at 13 numbers of handles and rotational speed of 240 rpm. In case of perforated tray aerator with hole diameter of 9 mm and discharge rate of 10 L/s, the maximum standard aeration efficiency obtained was 0.648 kg O_2/kWh. For the propeller-aspirator-pump aerator, the maximum standard aeration efficiency of 0.42 kg O_2/kWh was obtained at a positional angle of 75 degree, rotational speed of 2840 rpm and propeller shaft submergence depth of 0.14 m. The performances of circular stepped cascade (CSC) and pooled circular stepped cascade (PCSC) aerators are encouraging as the standard aeration efficiency (SAE) ranged between 2.16 to 2.70 kg O_2/kWh and 2.43 to 3.23 kg O_2/kWh respectively. It has been found that the pooled circular stepped cascade aerator has more standard aeration efficiency compared to the other aerators tested. Based on the above study, pooled circular stepped cascade aerator is recommended for use in pond culture.*

Keywords*: Aeration, Aerators, Standard aeration efficiency, Aquaculture.*