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## RESEARCH REPORTS

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**Title:** Nitrifying Characteristics Of A High Rate Packed Column

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**Abstract:** A system of high rate biofilter packed columns was operated using “synthetic” fish waste in order to characterize the operating parameters and nitrification rate for aquacultural water. Two sets of experiments were conducted: the first was designed to determine the range of hydraulic loading rates that could be achieved with the nitrification columns. The second served to determine the effect of oxygen concentration on nitrification rate within the columns.

Three columns (0.15m diameter and 3 m tall) were filled with 1.6 cm Pall™ rings. The columns were set on a 3 m<sup>3</sup> reservoir (test tank). In the first experiment, the columns were operated at three different flow rates (2 L min<sup>-1</sup>, 20 L min<sup>-1</sup>, 40 L min<sup>-1</sup>) and dissolved oxygen concentration was maintained at 100% saturation. In the second experiment, the three columns were operated at the same flow rate (24 L min<sup>-1</sup>) with 150% dissolved oxygen concentration. The “synthetic” fish waste was prepared daily and maintained refrigerated at 4 °C to reduce bacterial contamination and activity prior to introduction to the test tank. The synthetic fish waste was introduced into the test tank by means of a metering pump.

The first experiment verified that the lowest hydraulic flow rate did not allow effective nitrification in the column. Conversely, the highest flow rate resulted in high nitrification rate but the column had a tendency to flood or restrict air flow as the filter matured. The second experiment resulted in nitrification rates that average 0.08 g m<sup>-2</sup> d<sup>-1</sup> with maximum of 0.15 g m<sup>-2</sup> d<sup>-1</sup>. The second experiment will be continued by operating the columns at alternate dissolved oxygen concentrations (100%, 200%). The higher concentrations of dissolved oxygen are expected to result in higher nitrification rates.

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