

Exploration and Identification of Novel Anammox Bacteria in Indonesia

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Dissolved and accumulated fertilizer from agricultural land surrounding Lake Koto Baru, Indonesia, promote eutrophication. This condition could be a possible condition for anaerobic ammonium oxidation (anammox) bacteria that corresponds to oxidized ammonium into nitrogen gas using nitrite as electron acceptor anaerobically. The purpose of this study was to explore and to identify the anammox bacteria using sediment from Lake Koto Baru, Tanah Datar, Indonesia, as seeding sludge. The sludge was inoculated to a 1.5 L novel filter bioreactor (FtBR) for enrichment with a string wound filter as supporting media for biofilm. The mineral medium supplemented with 70–150 mg-N/L ammonium and nitrite was fed into the reactor through the inside of the filter with a 24-hr hydraulic retention time (HRT), continuously. FtBR was operated at room temperature (Run 1) and 35°C (Run 2). Influent and effluent water samples were collected twice a week for ammonium, nitrite, and nitrate concentration analysis based on the standard method. DNA of biofilm samples were extracted for microbial community analysis using Illumina Miseq sequencing. The performance of nitrogen removal in Run 1 was higher than Run 2 of which 98.19%, 92.95%, and 0.303 kg-N/m³.d for Run 1 and 88.61%, 68.93%, 0.214 kg-N/m³.d for Run 2, respectively. After 140 days of operation, a red biofilm covered filter carrier in Run 1 whereas black observation in Run 2. Phylogenetic affiliation of anammox species belong to genus *Candidatus Brocadia* and *Candidatus Anammoxoglobus* enriched. Two novel Candidatus-like species were predominantly discovered, were of 20.04% and 6.20%, respectively. The rare *Candidatus Anammoxoglobus propionicus* growth and predominant was found in Run 2, was were of 7.64%.

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