

**ANALISIS PENGARUH TOC, PH, DO, DAN SUHU
TERHADAP KEBERADAAN COMAMMOX
PADA SEDIMEN LINGKUNGAN ALAMI DAN BUATAN
DI SUMATRA BARAT**

TUGAS AKHIR

Sebagai salah satu syarat untuk menyelesaikan
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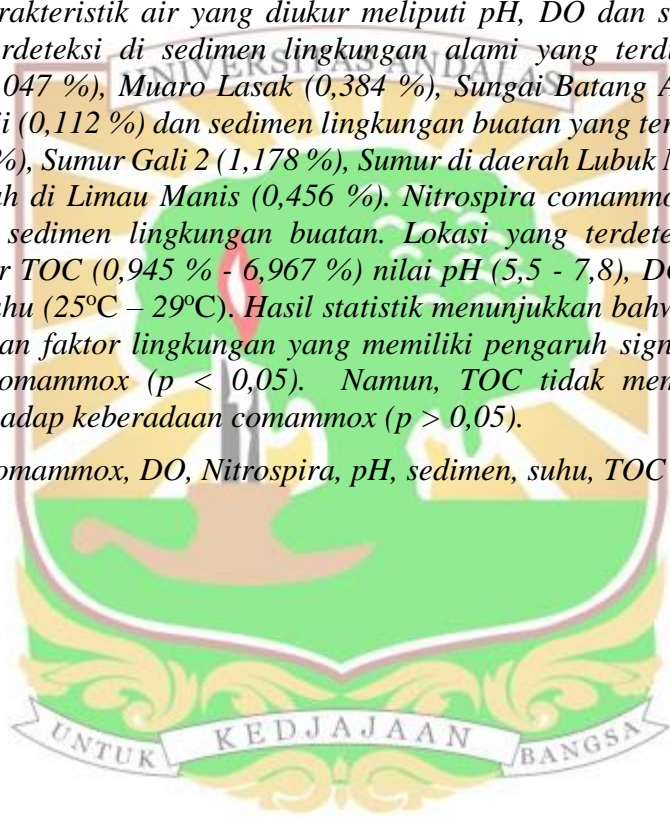
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ABSTRAK

Penemuan Complete Ammonia Oxidation (comammox) yang dapat mengoksidasi amonia menjadi nitrat telah mengubah konsep nitrifikasi. Penelitian tentang keberadaan mikrob *Nitrospira comammox* di berbagai sedimen lingkungan alami dan buatan, khususnya Sumatra Barat masih belum diketahui. Penelitian ini mengeksplorasi dan mengidentifikasi keberadaan *Nitrospira comammox* pada 30 lokasi sedimen lingkungan alami dan buatan. Selain itu, pengaruh Total Organic Carbon (TOC), pH, DO, dan suhu dianalisis terhadap keberadaan *Nitrospira comammox*. Identifikasi bakteri comammox dengan metode Next Generation Sequencing (NGS) menggunakan Illumina Miseq Sequencing. Kadar TOC dan pH yang terdapat di dalam sedimen diukur menggunakan spektrofotometer UV-Vis dan pH meter. Karakteristik air yang diukur meliputi pH, DO dan suhu. *Nitrospira comammox* terdeteksi di sedimen lingkungan alami yang terdiri dari Muaro Panjalinan (1,047 %), Muaro Lasak (0,384 %), Sungai Batang Arau (0,117 %), Sungai Kuranji (0,112 %) dan sedimen lingkungan buatan yang terdiri dari Sumur Gali 1 (0,067 %), Sumur Gali 2 (1,178 %), Sumur di daerah Lubuk Minturun (0,125 %) dan Sawah di Limau Manis (0,456 %). *Nitrospira comammox* lebih banyak ditemukan di sedimen lingkungan buatan. Lokasi yang terdeteksi comammox memiliki kadar TOC (0,945 % - 6,967 %) nilai pH (5,5 - 7,8), DO (3 mg/L - 4,2 mg/L), dan suhu (25°C – 29°C). Hasil statistik menunjukkan bahwa pH, DO, dan suhu merupakan faktor lingkungan yang memiliki pengaruh signifikan terhadap keberadaan comammox ($p < 0,05$). Namun, TOC tidak memiliki pengaruh signifikan terhadap keberadaan comammox ($p > 0,05$).

Kata kunci: comammox, DO, *Nitrospira*, pH, sedimen, suhu, TOC



ABSTRACT

The discovery of complete ammonia oxidation (comammox), which oxidized ammonia into nitrate, recently changed the concept of nitrification. Studies on the presence of comammox *Nitrospira* in different natural and artificial sediment environments, especially in West Sumatra, are still unknown. This study explored and identified the distribution of comammox *Nitrospira* in 30 natural and artificial sediment environments. Additionally, the effect of Total Organic Carbon (TOC), pH, DO, and temperature was analyzed on the distribution of comammox *Nitrospira*. Comammox bacteria were identified using Next Generation Sequencing (NGS) with Illumina Miseq Sequencing. TOC and pH levels in sediments were analyzed using a UV-Vis spectrophotometer and pH meter. The measured water characteristics included pH, DO, and temperature. *Nitrospira* comammox was detected in natural environmental sediments, including Panjalinan Estuary (1.047%), Lasak Estuary (0.384%), Batang Arau River (0.117%), Kuranji River (0.112%), and artificial environmental sediments, including groundwater well 1 (0.067%), groundwater well 2 (1.178%), groundwater well in Lubuk Minturun (0.125%), and ricefield in Limau Manis (0.456%). Comammox *Nitrospira* was found to be more abundant in artificial environmental sediments. The locations where comammox was detected had TOC levels (0.945% - 6.967%), pH (5.5 - 7.8), DO (3 mg/L - 4.2 mg/L), and temperatures (25°C - 29°C). Statistical results indicated that pH, DO, and temperature were environmental factors that significantly impacted the presence of comammox ($p < 0.05$). However, TOC did not significantly impact the presence of comammox ($p > 0.05$).

Keywords: comammox, DO, *Nitrospira*, pH, sediment, temperature, TOC

