

Enrichment and Characterization of an Ammonia-Oxidizing Archaeon of Moderate Thermophilic Taumarchaeotal Group I.1a from Cattle Manure Compost

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Composting is a technique that is widely used to change organic solid waste such as animal manure to the fertilizer. In the composting process, ammonia in fresh manure and the one produced from organic N in the process of composting volatile especially in the high-temperature phase of composting. It causes malodor and results in large loss of nitrogen in the fertilizer. A recent study showed that ammonia-oxidizing archaea was one of the dominant microbes throughout the composting. This ammonia-oxidizing archaea may contribute to preventing ammonia volatilization. In this study, we constructed the ammonia-oxidizing archaeal enrichment culture to obtain pure culture. We investigated the archaeal and bacterial community composition in enriched culture derived from cattle manure compost.

Compost sample was collected from a field-scale facility in Tohoku University in September 2009. Samples were suspended in ion exchange water, and were inoculated into inorganic liquid medium containing 10 mM $\text{NH}_4\text{-N}$. The liquid cultures were incubated at 46°C for 2 weeks. Serial passages were performed continuously over 4 years. DNA was extracted to be used for clone analysis. Only one archaean clone that had been dominated in compost was existed in the passaged culture, which was genetically related to *Candidatus Nitrososphaera gargensis*. On the other hand, bacterial clones were sorted 5 OTUs (Operational Taxonomic Unit) and clones related to *Brevibacillus* accounted over 60 %. All bacterial clones were heterotroph. These results indicated that the community composition in the passaged culture was simple containing only one species of ammonia-oxidizing archaea and a few species of heterotrophic eubacteria.