

3-4. Archaeal Community during Cattle Manure Composting Process in Field-scale Facility

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Composting process is a useful technique to transform cattle manure into organic fertilizer. During the process, complex microbial communities consisting of bacteria, archaea, and fungi carried out biodegradation of substrates. Because it has been considered that bacteria play an important role in composting, their community structure was studied well. However, archaeal one has not been identified clearly. To understand their community structure and abundance, cattle manure was composted in field-scale facility and composting materials were analyzed by culture-independent approaches. Clone library constructed from archaeal 16S rRNA genes showed that archaeal community in compost was mainly consisted of methane-producing archaea (methanogen) and ammonia-oxidizing archaea (AOA). During first 2 days, clones which were related to methanogens in the rumen or intestine were detected, suggesting that fecal methanogen could survive in the early stage of composting. Other methanogen, which grouped into thermophilic *Methanosarcina* spp. were present throughout the process, indicated that they might adapt the environmental changes such as high/low temperature. For the first time, AOA sequences were detected from composting materials. They showed high identity (98%) with cultured AOA originated from hot spring. The number of the archaeal genes from AOA were nearly same as or slightly higher than that of bacterial gene from ammonia-oxidizing bacteria (AOB), which initially considered the sole autotrophic ammonia oxidizers in the environment. In this study, we revealed the changes in archaeal community in the composting process. It was also suggested that not only AOB but AOA could actively involve in nitrification of composting systems.