ABSTRACT

ARI FINA BINTARTI. Methane Oxidation and Ammonium Accumulation Activity and Characterization of nifH and nifD Genes of Methanotrophic Bacteria from Ricefields. Under Direction of IMAN RUSMANA and ARIS TRI WAHYUDI

Methanotrophic bacteria have ability to oxidize methane. In addition they can fix atmospheric nitrogen, hence this bacterium has the potential role as a nitrogen source provider in the wetland. Nitrogen fixation process is catalyzed by the nitrogenase enzyme complex, encoded by nifH and nifD genes. Characterization these genes would support the use of methanotrophic bacteria in agriculture. Three methanotrophic bacteria isolated from rice fields i.e. BGM1, BGM3, and BGM9 were determined their methane oxidation and ammonium accumulation activities. Methane oxidation activity was analyzed using gas chromatography every two days. The concentration of ammonium in the culture supernatant was measured using phenate method. BGM1 isolate had a high ammonium accumulation rate, it was 2.77 ± 0.75 μmol/mL/day. The highest methane oxidation rate was shown by BGM3 isolate, the rate was 376.79 μmol/mL/day. nifD and nifH genes of three isolates and six other isolates (SS1, SS3, SS10, ST18, SP3 and INP4) were characterized. Based on nifH sequences analysis SS1 isolate was closely related to *Beijerinckia mobilis* and SS3, SS10, ST 18 isolates were closely related to *B. indica* subsp. *indica* ATCC 9039. While BGM3, INP4, and BGM9 isolates were related to nifH of uncultured nitrogen-fixing bacterium. Sequence analysis of nifD gene showed that SS1, SS3, SS10, ST 18 isolates were closely related to *B. indica* subsp. *indica* ATCC 9039 and BGM3, BGM9, INP4 isolates were closely related to *Xanthobacter autotrophicus* Py2.

**Keywords**: Methanotrophic bacteria, nitrogen fixation, nitrogenase, nifH, nifD