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CORRELATION ANALYSIS OF CH_4 EMISSIONS FROM PADDY SOILS WITH CHANGES IN OXIDIZABLE ORGANIC CARBON

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Abstract

Soil organic carbon is one of the key substrates affecting methane emissions in paddy fields. However, not all soil organic carbon forms methane. This study therefore involved comparative analysis of the methanogenesis of different organic carbon sources (rice straw, chicken manure and pig manure) in paddy field soils. The results indicated that whereas methane emissions from the pig manure treatment (PM) were not significantly different to those associated with the application of chemical fertilizer (CF), methane emissions from the chicken manure (CM) and straw treatments (RS) were greater by 1.67 times ($p < 0.05$) and 2.69 times ($p < 0.05$), respectively. Soil organic carbon content exhibited the same order as methane emissions: RS > CM > PM > no fertilizer. Correlation analysis revealed that, for different fractions of organic carbon, fraction 1 (organic carbon fraction oxidized by 33 mmol / L $KMnO_4$) and methane emissions were directly related. Thus, organic carbon in soil is easily oxidizable in organic carbon fraction 1 - the primary substrate for methanogenesis. The development of effective measures to reduce the content of this fraction may therefore represent a key method of mitigating methane emissions.

Key words: methane emission, organic carbon fraction, paddy field, soil organic carbon

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