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研究论文

FACE系统处理三年后淹水条件下土壤CH4和CO2排放变化

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摘要 采用淹水培养实验（25(C），在实验室CO2浓度和高CO2浓度（1000μl L-1）条件下，研究了稻麦轮作FACE系统运行3a后FACE处理和大气CO2浓度（Ambient）处理土壤CO2和CH4排放的差异。实验结果表明：经过FACE处理后，土壤有机碳含量较Ambient处理提高11%。在实验室和高CO2浓度下淹水培育60d，FACE处理土壤CO2累积排放量较Ambient处理土壤分别增加35%和22%，CH4累积排放量分别是Ambient处理土壤的2.6倍和2.3倍。高CO2浓度下培养，显著促进FACE和Ambient处理土壤的CO2排放量（p<0.01），促进CH4排放量，但未达到统计显著水平（p>0.05）。由此说明，大气CO2浓度升高可能直接影响土壤有机碳的转化速率和CO2及CH4的排放。

关键词 FACE；水稻小麦轮作；CH4和CO2排放

分类号 S153.6,S154.1

Changes of CH4 and CO2 emissions from soils under flooded condition after exposed to FACE (free-air CO2 enrichment) for three years

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Abstract To evaluate variations of CO2 and CH4 emissions from two FACE (free-air CO2 enrichment, F) soils and one ambient (A) soil three years after rice wheat rotation FACE treatment, laboratory incubation experiments with laboratory and elevated CO2 concentration (1000 μl L-1) were carried out under flooded conditions and at 25℃. Results show that soil organic carbon is increased by 11% after exposed to FACE treatment for three years. The results indicates that the cumulative CO2 emissions from FACE soils are 35% and 22% higher than that from the ambient soils, while the cumulative CH4 emissions from FACE soils are 2.6 and 2.3 times of that from the ambient soils. Thus, there is a larger ratio of the cumulative emissions of CH4 to CO2 in the soil F. Elevated CO2 concentration during the incubation stimulates the cumulative CO2 emission significantly, but its stimulation on CH4 emission is not statistically significant. The results indicate that elevated atmospheric CO2 concentration stimulates the turnover rates of soil organic matter with a net increase in soil organic matter content and alters the CH4/CO2 ratio.

Key words FACE; rice-wheat rotation; emissions of CH4 and CO2

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