

Publication

Methane from rice cultivation

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A field experiment was carried out to study CH₄ emissions from rice field as affected by two levels of soil tillage intensity (digging tillage and rotary tillage) and three rice cultivation patterns (direct seeding, seedling throwing and hand transplanting). Results show that the same in rice cultivation pattern, the tillage intensity treatments, digging and rotary tillage presented the same trend of seasonal variation in CH₄ flux. The effect of tillage intensity on total CH₄ emission during the rice-growing period depended on rice cultivation pattern; compared with digging tillage, rotary tillage decreased CH₄ emission significantly by 31.37% with seedling throwing adopted; and did not have much effect with direct seeding and hand transplanting adopted. Rice cultivation pattern had significant effects on seasonal variation of CH₄ flux. The CH₄ flux in direct seeding treatment showed roughly a "two-peak" seasonal variation curve, being relatively low at the early rice growing stage. The CH₄ flux in transplanting treatments (seedling throwing and hand transplanting) displayed three-peak" seasonal variation curve, being relatively high at the early rice growing stage and reaching the highest level on D12 after rice transplanting. With digging tillage, the total CH₄ emissions, regardless of rice cultivation patterns, all increased, but did in the order of seedling throwing > direct seeding > hand transplanting. With digging tillage, compared with seedling throwing, direct seeding and hand transplanting decreased CH₄ emission by 23.31% and 42.51%, respectively; with rotary tillage, total CH₄ emission in the three rice cultivation patterns were almost the same. Reducing soil tillage intensity by using rotary tillage instead of digging tillage could reduce disturbance of soil, thereby decreasing CH₄ emission from the rice field to some extent. Compared with rice transplanting, rice direct seeding could significantly decrease CH₄ emission at the early rice growing stage, which obviously has some potential in CH₄ reduction, but field water management needs to be intensified at the middle and late stages of the rice growing season.

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