

Role of Aquatic Earthworms on Mitigation of Methane Flux from Paddy Field

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Abstract: A 2x2 factorial experiment; two levels of tillage (tillage and no-tillage) and two different fertilizers (chemical fertilizer and organic fertilizer) was conducted in Paddy field of Central Park of Kamakura to explore potential influence of aquatic earthworms on methane mitigation in paddy field. Earthworms density and methane flux was monitored each month intervals. A clear antagonistic effect of earthworms on methane flux was found in mid growth stage of rice plant, and the flux was half of no-worm condition when the worm density was more than 11,000/m².

Introduction: Agriculture is a major emitter of green house gases. Conservation agriculture and organic farming are low-emission farming systems and climate-friendly agricultural practices. Paddy field is a major source of Methane (CH₄), a highly efficient greenhouse gas and may account for 20% of anticipated global warming. Adding of oxygen in soil layers minimize methane emission from paddy field soils. Bioturbation activities of soil animals like aquatic earthworms may play a influential role in oxygen supply to anaerobic paddy field environment. In this study it was hypothesized that bioturbation activities of aquatic earthworms may accelerate methane oxidation in paddy field.

Objectives

- To know the effects of farming practices on earthworm density in paddy field.
- To determine the role of earthworms on methane emission from paddy field.

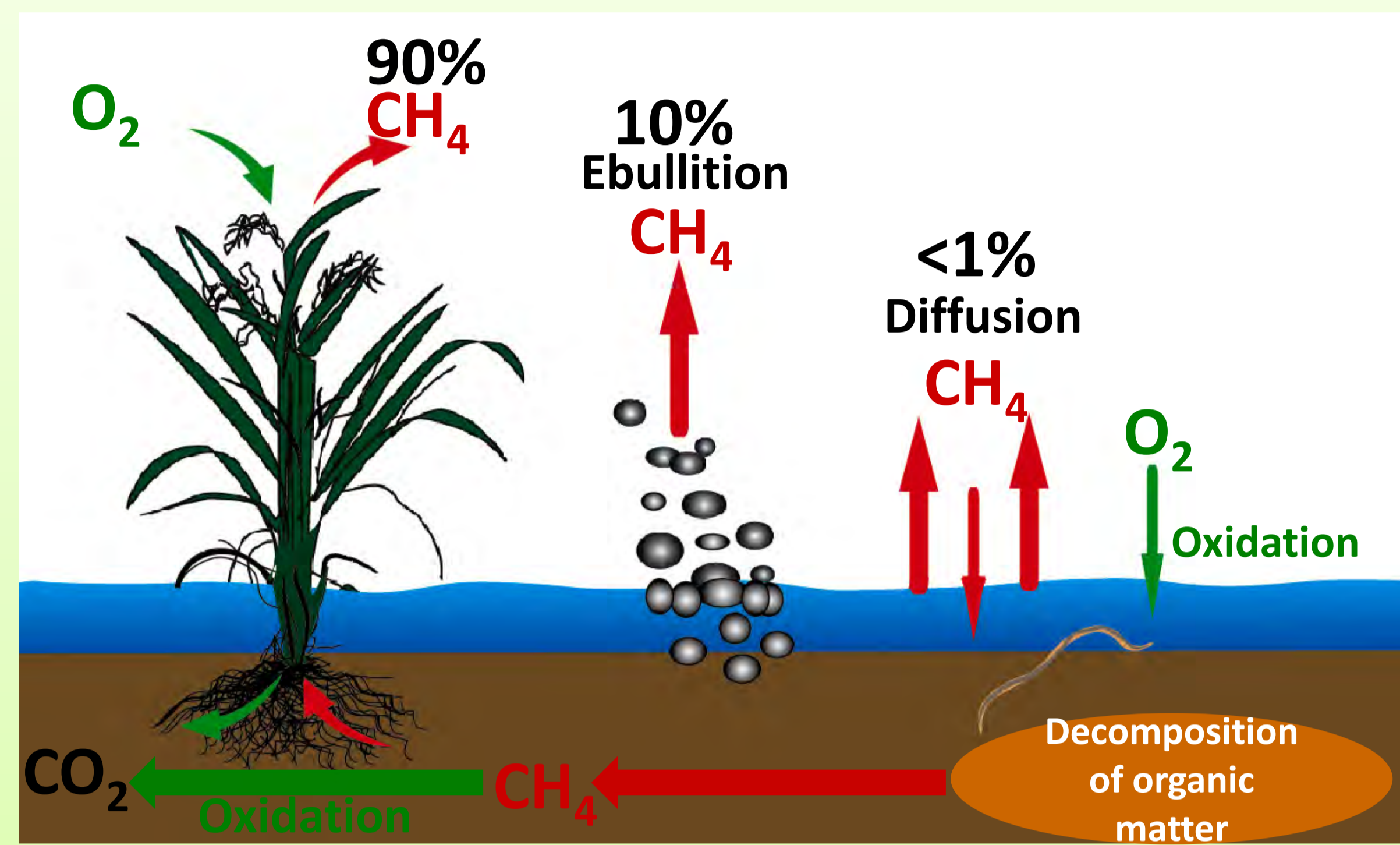


Figure 1: Fate of CH₄ in paddy field environment

Methods



Photo 1: Location of field study

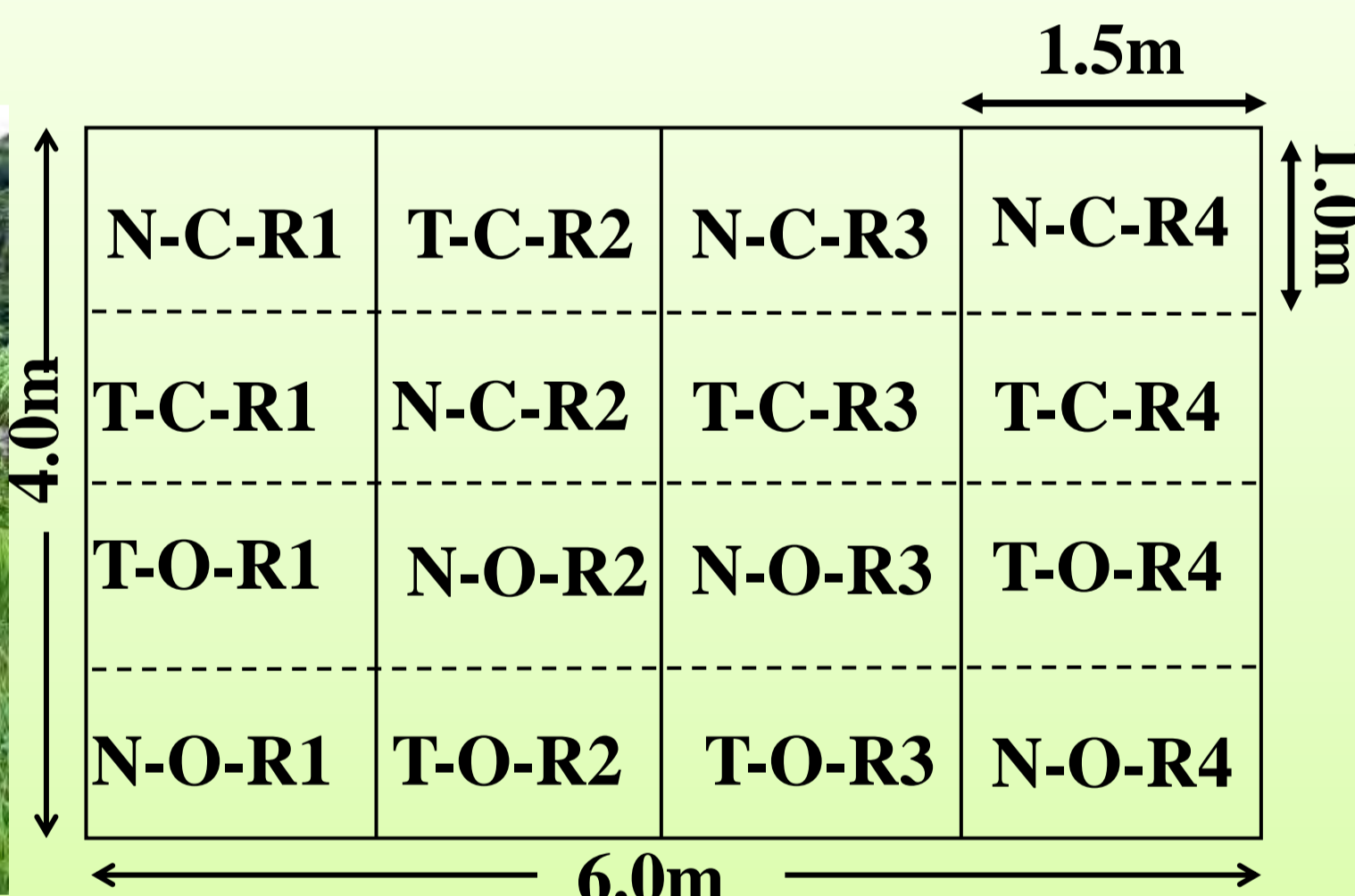


Figure 2: Field layout



Photo 2: Collected earthworm from soil samples

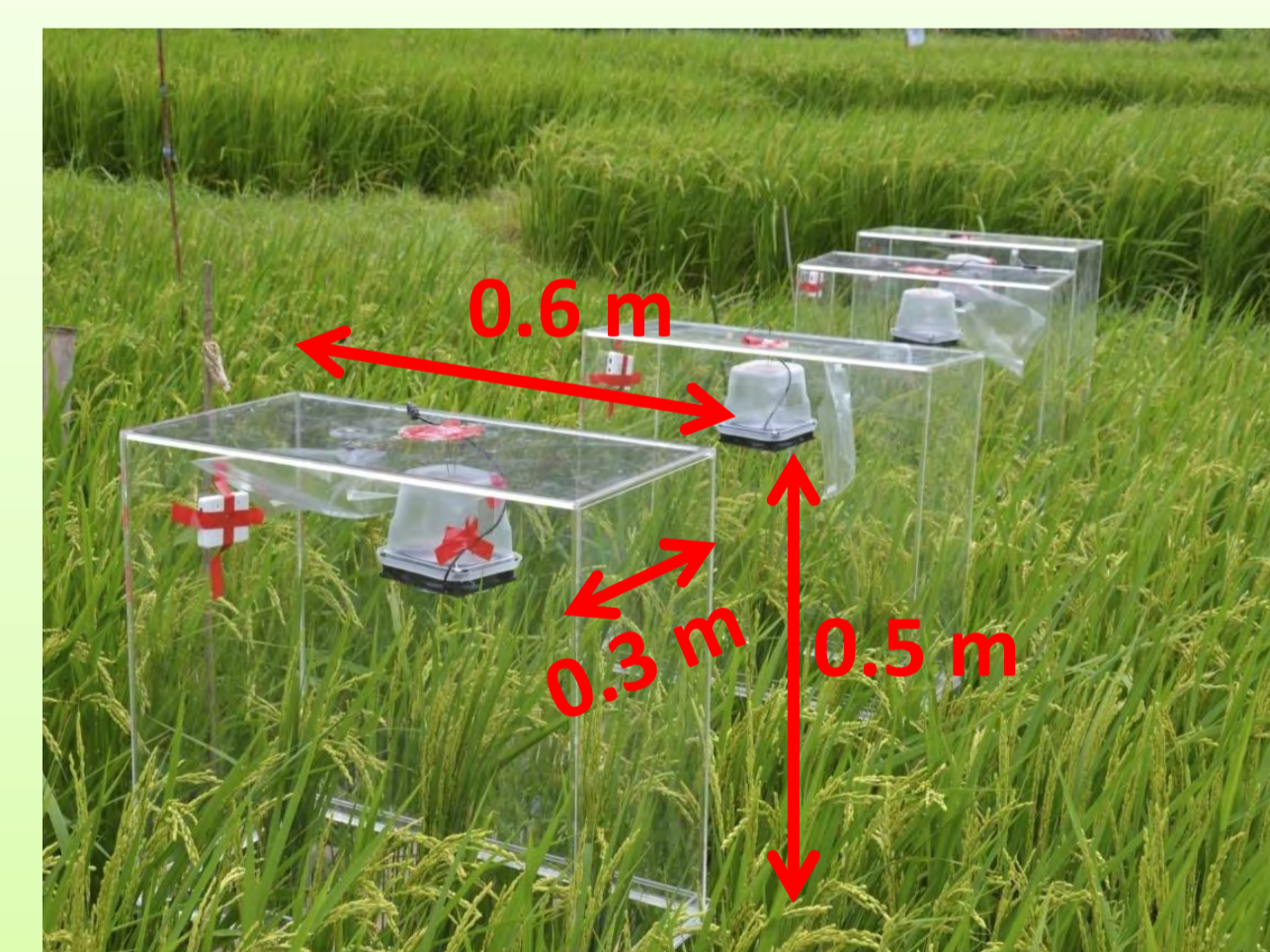
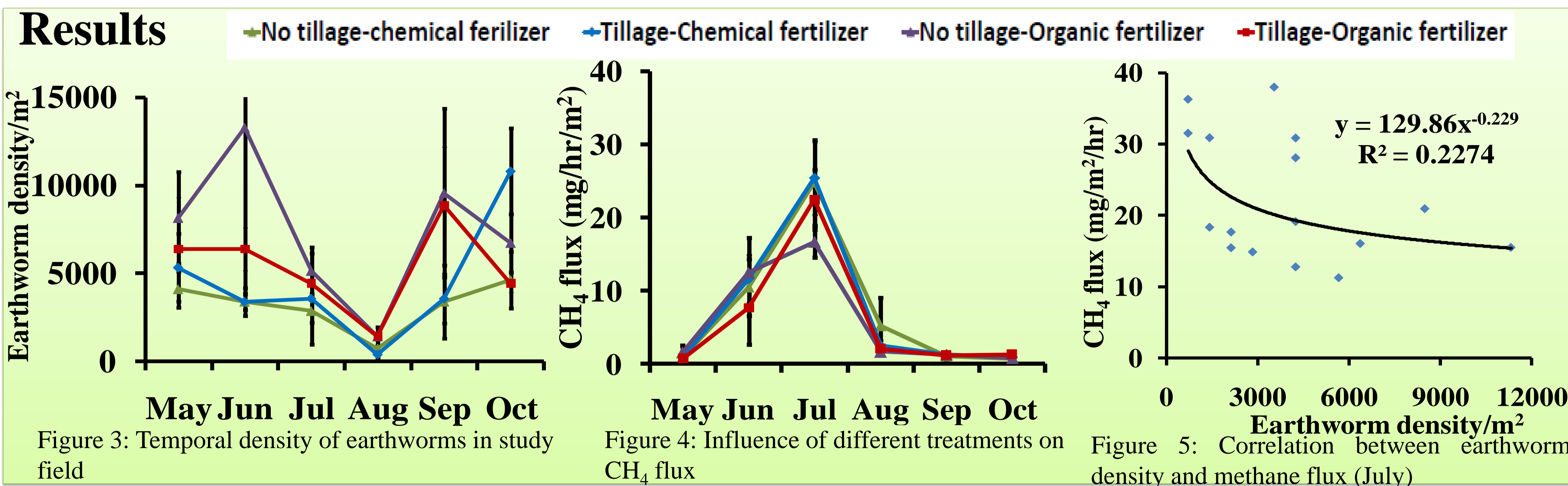


Photo 3: Chambers for gas collection

Results



Conclusions

- ✓ No tillage farming practice with organic fertilizer could provide favorable environment for aquatic earthworms activity.
- ✓ Stimulation of aquatic earthworm activities with favourable farming practices may acts as a reducing factor of methane emission from paddy field.

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