

## The effect of gas emission from organic matter on the stability of rice terraces structure

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The rice terraces are not only cultural heritage, but also playing a part of natural material circulation. They contribute to the water conservation and organic matter preservation, otherwise inclined slope causes surface flow and organic matter loss. However, in recent years, rice terraces have not been sufficiently preserved, leading to collapse. In the world heritage rice terraces in Banaue, Philippines, drainage channels are not well-organized, and some of the rice terraces are rich in organic matter in the situation where sewage is mixed. Although ponding water was maintained, this water has been kept by clogging of organic matter or small particles rather than hardpan formation.

In this research, we examined how gas emission prevented hard pan formation. Incubation tube experiment was conducted for gas emission and bulk density change, and also soil column experiment was conducted for water content and Eh measurement. Both experiments were conducted by changing organic matter content.

The results showed that methane gas emission was observed only with one week and the methane stayed in the column in bubble shape, not soluble condition. This was supported by the Eh reduction and volumetric water fluctuation. Bulk density of incubation tube decreased by 10-20%, which would result in unstable basement. Volumetric water fluctuation meant the frequent bubble formation and disappearance, causing fluctuation of basement. If this happens in rice terraces, saturated zone would be deeply developed, making unstable rice terraces which has a risk of collapsing. Therefore, we need to tell local people to check hardpan formation, sewage water control and appropriate organic matter application, rather than just confirming ponded water.

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