How to reduce greenhouse gas emissions from soil amended with organic matter?

Agriculture is responsible for emissions of greenhouse gases such as carbon dioxide (CO₂) and nitrous oxide (N₂O). Production of these gases in soil results from the biological processes like organic matter decomposition, nitrification and denitrification. These processes are regulated by easily decomposable carbon, mineral nitrogen, temperature, pH and moisture content in soil. We aim at analyzing effects of these parameters on CO₂ and N₂O emissions. In particular, we are interested in agricultural soil amended with livestock compost.

Analysis of groundwater contamination with inorganic N in Central Vietnam by using stable isotopes and microbial technologies

High concentrations of inorganic nitrogen (NH₄-N and/or NO₃-N) were found in groundwater below vegetable fields in the downstream areas of the Huong River, Central Vietnam. The objective of the study is to determine the contamination sources and mechanisms of nitrogen contamination in groundwater by using δ¹⁵N natural abundance (δ¹⁵N) and functional genes of microorganisms. We have developed a new method to collect NH₄-N, NO₃-N, and organic N in water samples for δ¹⁵N analysis. Functional genes like narG, napK, and nosZ are quantified to obtain the information on nitrogen dynamics in deep soil.

Installing artificial macropore to enhance infiltration and increase organic matter in soils.

Soil is the largest carbon storage body at terrestrial area. Our previous research showed that macroporous soils conduct surface water without clogging and that bypass flow by macropores segregated organic matter from the surface. Organic matters will be effectively conserved by these physical processes, which contributed greatly to carbon storage as well as bio-chemical processes.

Linear Macropore Installation for Reducing Red-soil Erosion at Sugarcane Field.

Red-soil erosion in sugarcane fields has been reported as a significant agricultural and environmental problems in Ishigaki Island in Okinawa, where such erosion has led to loss of nutrient-rich agriculture soil and also negatively impacted coral reefs. We introduced linear-macropore to the field. The result showed that the erosion almost cancelled the conservative land management and installation of linear macrore reduced surface water and erosion amount to 1/7.