

Effects of Addition of plant-derived dissolved organic matter (DOM) on decomposition of soil organic matter

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Plant-derived dissolved organic matter (DOM), a common input to farmland soils, plays an important role in soil carbon (C) and nitrogen (N) cycling. Effects of plant-derived DOM on soil CO₂ and N₂O emissions were investigated by a set of pot experiment in a winter wheat/summer maize double cropping system in the North China Plain (NCP). Adding plant-derived DOM alone or together with urea N to soil accelerated the decomposition of native soil organic matter (SOC), also resulted in greater emissions of CO₂ and N₂O when compared with only adding urea N. In addition, the effect of plant-derived DOM on the decomposition of native SOC was heightened by adding urea N. In wheat growing seasons, the increased CO₂ emission resulted from adding plant-derived DOM was significantly related to the increased soil microbial biomass. The soil N₂O emission was positively correlated with the soil CO₂ emission and, the soil dissolved organic carbon (DOC), but not correlated with soil mineral N. Those indicate that the magnitude of soil N₂O emission induced by plant-derived DOM could be driven by the microbial C demand rather than N demand. The results suggested that fast releasing large amount of DOM from crop residues returned to the field, especially together with application mineral N may not to be beneficial to soil C sequestration, but to increase greenhouse gas emissions. Therefore, the releasing amount of plant-derived DOM should be slowdown, meanwhile avoiding over use fertilizer N in farming practices.