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Long-term application of farmyard manure to arable soils does not, in itself, promote the spread of antibiotic resistance genes

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Misuse of antibiotics has exacerbated the development and spread of antibiotic resistance in microbes in the environment, promulgating calls for nations to adopt mitigation strategies. Farmyard manure (FYM) has a long history in soil fertility management which is being re-evaluated because of a combination of rising mineral fertilizer costs, concerns for sustainable soil management and ecological stability. However, FYM may act as a reservoir of antibiotic resistance genes (ARGs) and resistant organisms: the effect of long-term application of FYM on ARGs in soil needs to be established. We studied ARGs in arable soil treated for 175-years with FYM or chemical fertilizer (CF) and native woodland (W). Metagenomic analysis showed that the abundance of *fox5*, $bla_{CTX\text{-}M\text{-}4}$, *vgb*, *tetG*, *sul1*, *vanA* and *floR* genes were significantly lower in FYM than W, and the abundance of fox5, vgb and tetX genes in FYM were also significantly lower than CF. The phylogenetic diversity of individual ARGs was also typically lower in FYM than either CF and W. Despite this, there were no significant differences in the abundance of integrase genes (*intI1* and *intI2*). There were also no significant differences in the abundance of metal resistance genes, except *merB* associated with Hg-resistance, which was more abundant and had an increased phylogenetic diversity in FYM soils. Overall, FYM did not increase the abundance and diversity of ARGs significantly and there was only limited association between ARGs and metal resistance genes in the soils.

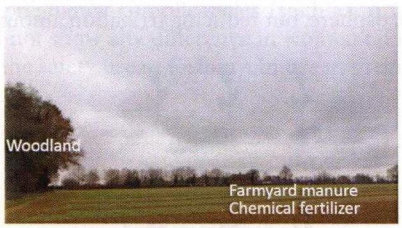

Fig. 1 Experimental site

Biography

Yuan Liu is mainly engaged in the research of rhizospheric electrochemistry and chemical behavior of nutrients and pollutants such as heavy metals, antibiotics and antibiotic resistance genes during farmland irrigation with unconventional water resources such as livestock wastewater and reclaimed water. .

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