Microbial Community Variation and Interaction in the AMD-impacted paddy soil after pH elevation

MENGGE JIANG, CHULING GUO, ZHI DANG

School of Environment and Energy, South China University of Technology, Guangzhou 510006, China
(*correspondence: clguo@scut.edu.cn)

Acid Mine Drainage (AMD) was a type of acidic, meta-rich wastewater, which has threatened the surrounding environments, especially agriculture soil. Due to the comprehensive treatment of the source of AMD-polluted rivers, the pH of the irrigation water from the AMD-impacted river rises remarkably, forming *in situ* natural soil samples with significant changes in pH. To figure out the adaptation of microbial community in the long-term AMD-impacted paddy soil, we investigated the succession of microbial community and species interaction mechanism before and after pH elevation. Microbial communities were dominated by bacteria *Candidatus Solibacter* and *Candidatus Koribacter* from the *Acidobacteria* family in the AMD-impacted paddy soil. The abundances of *Acidobacteria* and *Crenarchaeota* were significantly positively correlated with AMD-related environmental factors pH and heavy metals (Cu, Pb, Zn). However, the microbial community characteristics were significantly different within one year after pH change of the irrigation water. The most dominate bacterial phylum *Acidobacteria* was replaced by *Proteobacteria*, and archaeal community still dominated by *Crenarchaeota* after pH elevation. Microbial molecular ecological network was further applied to identify the core-microbiome which maintained the structural stability of the paddy soil ecosystem. Responding to the increased pH of the irrigation water, the new dominant strain *Proteobacteria* in the soil began to take the responsibility of modular hub in the bacterial network, although the relative abundance of *Acidobacteria* decreased significantly, *Acidobacteria* species still play connectors' role in the network. Meanwhile, rare microbial groups were also suggested to contribute effectively to the stability of the ecosystem. Compared with the bacterial community, the archaeal communities in the soil exist in a more segregated network, and the degree of communication and niche sharing between different types of archaea are lower, indicating the archaeal community network has lower complexity and may be more stable. The archaeal community was more resistant to environmental disturbance than bacterial community. More results will be discussed in the presentation.