

Response of microbial community regulated by lactate and anthraquinone-2, 6-disulfonate (AQDS) during pentachlorophenol transformation in paddy soil

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Lactate and humic substances (HSs) that can drive and stimulate microbial reductive reactions are widely distributed in soils. Pentachlorophenol (PCP), a commonly detectable toxic pesticide can act as electron acceptor for microbial reductive reactions under anaerobic soils. However, the effect of toxic and antimicrobial PCP on microbial community diversity and composition during PCP transformation is still unclear. The present study investigated the effect of PCP on microbial community in the presence of lactate as electron donor or AQDS (HSs analogue) as electron shuttle. Compared to the treatments without PCP, the addition of PCP stimulated the functional groups involved in PCP dechlorination, such as dechlorinating and iron reducing microorganisms (*Clostridium*, *Desulfitobacterium*, *Pandoraea*, and unclassified *Veillonellaceae*) while some dominant genera in raw soil were dormant. In all treatments with PCP, the addition of lactate or AQDS can enhance PCP dechlorination by stimulating the growth of functional groups involved in PCP dechlorination and changing the microbial community during dechlorination process, and the microbial community tended to be uniform after PCP complete degradation. However, when both lactate and AQDS appeared simultaneously in PCP-contaminated soil, lactate was mainly used to promote microbial community while AQDS was attributed to change redox potential. Therefore, lactate supplement or the addition of AQDS could be alternative strategies for PCP-contaminated soil remediation when we know which microorganisms are sensitive to PCP contamination. These findings expanded the knowledge of the effect of PCP on the microbial community and their interactions with electron donors and shuttles under anaerobic paddy soils.