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CONTRASTIVE SOIL PROPERTIES, MICROBIAL STRUCTURE AND SOIL ENZYMES IN THE RHIZOSPHERE OF *Scirpus triqueter* AND BULK SOIL IN PETROLEUM-CONTAMINATED WETLAND

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Abstract

Though *Scirpus triqueter* plays an important role in protecting the ecological functions of Yangtze River estuary wetland which is frequently contaminated by petroleum, knowledge is limited about the mechanisms involved. In this study, comparative analysis of soil properties, microbial community structure and soil enzymes in the rhizosphere of *S. triqueter* and bulk soil was conducted throughout one year to provide an insight into the phytoremediation mechanism in the field. The total petroleum hydrocarbon content and soil pH in the rhizosphere were averagely 0.06 g kg^{-1} and 0.1 lower, respectively, than in the bulk soil. Analysis of phospholipid fatty acids shew the microbial community structure was quite different from that in the bulk soil with much higher activity and diversity. The relative abundance of Gram-positive to Gram-negative bacteria was 0.12 lower in the rhizosphere, while the relative abundance of aerobes to anaerobes was 0.74 higher, than in the bulk soil. Positively correlated with the relative abundance of fungi to bacteria and microbial diversity, the activities of dehydrogenase, catalase, polyphenol oxidase were significantly lower ($P < 0.05$) in the bulk soil than in the rhizosphere. Redundancy analysis and Pearson correlation shew that soil organic matter, total nitrogen, total phosphorus, as well as temperature were crucial factors influencing soil microbial communities and enzymes which were responsible for the degradation of petroleum hydrocarbons. These results would improve our understanding of the phytoremediation processes in fragile contaminated wetland and supply valuable information for its application in the restoration of damaged ecosystems.

Key words: microbial community structure, petroleum pollution, phytoremediation, *Scirpus triqueter*, soil enzymes

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