

Performance and the microbial community of horizontal subsurface-flow constructed wetland for rural sewage treatment

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ABSTRACT

Horizontal subsurface-flow constructed wetlands are commonly used to remove pollution from sewage. This study compared the treatment performance and microbial community structure of wetland with *Phragmites communis*(A) and *Typha orientalis Presl*(B) in different seasons. Two parallel pilot-scale wetlands for rural sewage treatment were operated for one year. The average removal efficiency of pollutants from high to low is in the order of summer > spring > autumn > winter, and the highest removal rates for COD, NH₃-N, and TP are 90, 92, and 69.29%, respectively. Pollutant concentrations are lower in wetland B than those of wetland A, thereby indicating that the purification capacity is better in *Typha orientalis Presl* than *Phragmites communis*. The microbial community of the wetland was analyzed by polymerase chain reaction-denaturing gradient gel electrophoresis. This analysis showed that the numbers of dominant bands are greater and relatively brighter in spring and summer than in autumn and winter. The presence of least bands during winter indicates that the structure of microorganisms is relatively simple at low temperature. The highest and lowest Shannon indexes are in summer and winter, respectively. Results of the sequencing analysis show that *Firmicutes*, *Bacteroidetes* and *Proteobacteria* are the three microbial communities with the highest pollutant removal rate.

Keywords: Rural sewage; Wetland; Seasons; Plants; Microbial communities

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