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Bacterial community dynamics in the engineered biocover installed on a sanitary landfill site for mitigation of methane and odor emissions

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Methane and unpleasant odors emitted from landfills have been caused global warming and complaints. The use of engineered biocovers is a promising strategy toward mitigating methane and odor emissions from smaller and/or older landfills. Since the filter bed in a biocover is a key factor to determine methane and odor removal efficiency and the characterization of the microbial dynamics in the filter bed is very important. Moreover, there is also a lack of information on microbial communities in biocovers installed on field landfills. The engineered biocover (10 m in length × 5 m in width × 1 m in depth) was constructed on a sanitary landfill site located at Jeollanam-do, South Korea. The mixture of soil, perlite and earthworm cast (26:6:2.5, volume ratio) was used as packing materials and inoculum sources for the biocover. Methane and odor removal efficiencies were evaluated and the dynamics of bacterial community structures in the biocover as a function of time were monitored by 16S rDNA pyrosequencing. Based on the dilution to threshold ratios derived by the air dilution sensory test, the removal efficiencies for complex odor were ranged from 95.0% to 98.6% during winter season from January to March. The representative odor compounds were ammonia, hydrogen sulfide, methanethiol, dimethyl sulfide, dimethyl disulfide, styrene, toluene, xylene, methyl ethyl ketone, acetic acid and *n*-butylic acid. Methane removal efficiencies were 21.5% to ~33.5%. *Methylobacter* (40%) and *Flavobacterium* (38%) were found as dominant bacteria. *Rhodanobacter*, *Arenibacter*, *Arthrobacter*, *Algoriphagus*, *Nannocystis*, *Rhodobacter* and *Paenibacillus* were detected in the biocover.

Biography

Kyung-Suk Cho has completed her PhD from Tokyo Institute of Technology (TIT) and Postdoctoral studies from TIT and KAIST. In 1994, she has joined the Faculty at Ewha Womans University, Seoul, South Korea. She operates the Environmental Bioengineering Laboratory in the Department of Environmental Science and Engineering. Her expertise is in bioremediation and ecological technology using microorganisms. She has published more than 110 papers in international journals.

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