Discharge of landfill leachate to streambed sediments impacts the mineralization potential of phenoxy acid herbicides depending on the initial abundance of tfdA gene classes

Discharge of landfill leachate to streambed sediments impacts the mineralization potential of phenoxy acid herbicides depending on the initial abundance of tfdA gene classes

To understand the role of abundance of tfdA gene classes belonging to β- and γ-proteobacteria on phenoxy acid herbicide degradation, streambed sediments were sampled around three seepage meters (SMs) installed in a landfill-impacted groundwater–surface water interface. Highest herbicide mass discharge to SM3, and lower herbicide mass discharges to SM1 and SM2 were determined due to groundwater discharge rates and herbicide concentrations. SM1-sediment with the lowest abundance of tfdA gene classes had the slowest mineralization, whereas SM2- and SM3-sediments with more abundant tfdA genes had faster mineralization. The observed difference in mineralization rates between discharge zones was simulated by a Monod-based kinetic model, which confirmed the role of abundance of tfdA gene classes. This study suggests presence of specific degraders adapted to slow growth rate and high yield strategy due to long-term herbicide exposure; and thus groundwater–surface water interface could act as a natural biological filter and protect stream water quality.

General information
State: Published
Pages: 275-283
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Environmental Pollution
Volume: 176
ISSN (Print): 0269-7491
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5 SJR 1.615 SNIP 1.46
Web of Science (2017): Impact factor 4.358
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.27 SJR 1.827 SNIP 1.74
Web of Science (2016): Impact factor 5.099
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.72 SJR 2.003 SNIP 1.75
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.57 SJR 1.987 SNIP 2.005
Web of Science (2014): Impact factor 4.143
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.35 SJR 1.976 SNIP 1.94
Web of Science (2013): Impact factor 3.902
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.03 SJR 2.038 SNIP 1.74
Web of Science (2012): Impact factor 3.73