COMPARATIVE MINERALISATION OF PYRENE IN A SPIKED AND AGED SOIL BY A PYRENE-DEGRADING BACTERIUM ISOLATED FROM A PAHS-CONTAMINATED SOIL AND EFFECT OF THE PRESENCE OF CYCLODEXTRIN

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A pyrene-degrading bacterial strain E2BCU-2008-S8.3 was isolated from an aged PAHs-contaminated soil from the North of Spain. The strain was identified as Achromobacter sp. by 16S rDNA gene sequence analysis technique. To screen for the ability of this bacterium to mineralise pyrene, the strain was cultured in a Tryptic Soy Broth medium diluted 20 times, inoculated at 24°C and exposed in triplicate to 166 Bq g⁻¹ of soil of ¹⁴C-pyrene. In addition, 0.5 mg of nonradio-labeled pyrene was added to each culture. Achromobacter sp. mineralised (degraded to CO₂) 55.5% of the pyrene at the end of the study. To investigate how degradation might be optimized in a pyrene spiked and aged soil, pyrene mineralisation by the indigenous microbial community was monitored over 140 days, and compared with mineralization in the presence of: i) hydroxyporplil-β-cyclodextrin (HPBCD) as amendment (biostimulation), ii) Achromobacter sp. addition and 3. a combination of HPBCD and Achromobacter sp. The ability of indigenous microflora to mineralise ¹⁴C-pyrene was appreciable (30.5%). Addition of HPBCD resulted in an important reduction of lag phase duration, from 79 to 54 days, but with no increase of the total extent of mineralization (31.0%). The high reduction of lag phase is related with the fact that HPBCD improves the solubility of pyrene and as a consequence the pyrene bioavailable fraction is ready to be degraded as soon as HPBCD is added. On the other hand, the addition of Achromobacter sp. alone resulted in a drastic reduction of lag phase, from 79 to 45 days, however the total extent of mineralization of ¹⁴C-pyrene was slightly lower (25.7%) than in non amended soil, this result indicates that the introduced bacteria limits the activity of the indigenous microorganisms in the studied soil.