

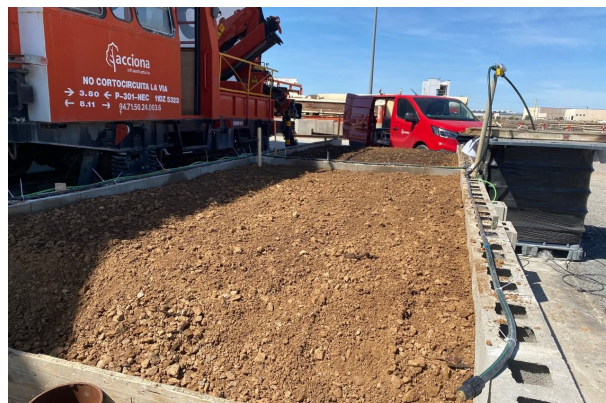
Upscaling of Biopiles with Biostimulation, Bioaugmentation and Control

Short Description

As a final step of the European Horizon 2020 GREENER project, the project partners ACCIONA, the Universidad Autónoma de Madrid and the Universidad de Burgos developed a real scale bioremediation experiment. To this end, taking into account the results obtained at laboratory scale (microcosms) and pilot scale (mesocosms), two biopiles were constructed with the aim of testing the degradation of TPHs (Total Petroleum Hydrocarbons) and PAHs (Polycyclic Aromatic Hydrocarbons) under real operating conditions. Two 10-tonne biopiles were constructed; one in which natural attenuation was tested as a control, and another in which a bioaugmentation treatment was performed and vermicompost was also added as an organic amendment.

The bioaugmentation was carried out with the addition of a synthetic community composed by microorganisms with biological risk factor 1, designed to enhance their degradative capacities and improve the efficiency of the treatment.

Although the biopiles were initially intended to be in operation for three months, promising results led to them being maintained for a full year, with degradations of up to 70% in the TPHs from the bioaugmented biopile.



Methods

Bioaugmentation using a synthetic microbial community, and adding nutrients and vermicompost.

Location

ACCIONA facilities in Alcobendas – Madrid (Spain)

Outcomes

This experiment was conducted by ACCIONA, the Universidad Autónoma de Madrid and the Universidad de Burgos, all partners of the European Horizon 2020 GREENER project. While the experiment has already concluded, all project partners are still working on further developing the results obtained. At this point in time, they can state that the biopile in which the bioaugmentation was applied to has had promising results, achieving a degradation of the TPHs retained in the soil by up to a 70% after 240 days of operation. At the same time, the control biopile recorded a 20% degradation through natural attenuation.

Responsible

ACCIONA, the Universidad Autónoma de Madrid and the Universidad de Burgos, in the frame of the GREENER project



Outreach

The work linked to this study was presented in various scientific publications, including in the following papers:

1. <https://doi.org/10.1016/j.chemosphere.2022.135638>
2. <https://doi.org/10.19084/rca.28440>
3. <https://doi.org/10.1016/j.envpol.2022.120472>
4. <https://doi.org/10.1007/s11356-024-32916-8>
5. <https://doi.org/10.1016/j.envres.2024.118880>

In addition to this, the findings of this study were presented in several key conferences, including the AquaConSoil 2021, the EUROSOIL 2021, the Bioremid 2023, the 8th European Bioremediation Conference, the 22nd World Congress of Soil Science, the 7th International Symposium on Environmental Biotechnology and Engineering, the Congreso Ibérico de Suelos y Desarrollo Sostenible 2021, the Congreso Ibérico de Ciencias del Suelo 2022 and the CONDEGRES 2024.

Contacts

Blanca Juez Sánchez
ACCIONA
blanca.juez.sanchez@acciona.com

Sandra Curiel Alegre
Universidad de Burgos
scuriel@ubu.es

