

Developing Strategies To Enhance Sustainable Biological Processes in Contaminated Urban Soils

Objectives

- To characterise a range of urban soils in terms of (a) the activity and diversity of key groups of the soil biota, (b) the physico-chemical environment they offer to soil biota, and (c) their ability to support plant growth.
- To identify relationships between the three elements of 1 using multivariate approaches.
- To determine the responses of key taxa to environmental factors identified in 2.
- To estimate the diversity and competence of existing populations of microbial symbionts of roots within degraded soils.
- To measure the survival and performance of introduced symbiont taxa.
- To measure the effect of tree symbioses on the development of soil communities and the ability of these and of some symbiotic fungi to degrade organic pollutants.

Location

West Midlands/South Yorkshire

Approach

This project uses a combination of extensive and intensive elements - a survey of the physico-chemical and biological conditions of a range of industrially damaged sites, and an analysis of the function of a key group of the soil biota, namely, root symbionts.

The complexity of soils means that it is necessary to use a multi-dimensional and multi-variate approach to assess the 'health' of soils. Particular emphasis on key groups in the soil microbial and faunal biota, their ecotoxicological responses and the ability of soils to support plant growth will provide a sensitive means of determining the combined effects of many interacting factors on soil health in the urban environment. The project will also examine soil physical properties, nutrient availability and contaminant loads and will relate these to the biological parameters. To be able to offer guidance on rehabilitation strategies, however, it is also necessary to determine the impact of variation in soil physico-chemical parameters and biological diversity on the function and sustainability of the urban ecosystem. This requires an intensive investigation of the biological performance of a key set of species.

Planting (or occasionally, natural regeneration) of trees is a standard goal for restoration of urban sites. All trees are naturally, and often effectively obligately, symbiotic. The project will, therefore, undertake an intensive investigation of the interaction between trees and their microbial symbionts, since tree survival on degraded soils is almost certainly not related simply to their capacity to cope directly with contaminants and poor soil condition, but also the ability of their root symbionts to develop and function in the soil. The symbionts are, therefore, a critical part of the biological component of urban soils, necessary for its health and sustainable use, and can be regarded as key species.

Start date/duration

January 1998 Four years

Lead Organisation

University of York
CEH Merlewood
CEH Monks Wood
British Geological Survey
University of Reading

Deliverables

- identification of potential causal agents of biological malfunctioning of urban soil ecosystems which will ultimately permit appropriate rehabilitation strategies to be devised for polluted and otherwise degraded sites
- identification of key taxa within the soil biota for which specific enhancement programmes will be required
- definition of inoculation and management protocols involving microbial symbionts of trees to ensure successful restoration of degraded sites.

Users

Environment Agency
British Gas plc

Further Details

Further information is available from the following contacts:

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