Distribution Patterns – Distribution Of Soil Organisms

Distribution of soil microbial communities

Microbial ecologists describing the distribution of soil microorganisms on a large spatial scale generally invoke one of the oldest fundamental paradigms in microbial ecology 'everything is everywhere, but, the environment selects'. The fact that more than a trillion microorganisms are transported annually through the atmosphere between continents supports the hypothesis of a wide dispersion of microbes. To date, it is impossible to come to sound conclusions about the rank of environmental filters driving the soil microbial assembly to a large extent.

Soil bacterial communities

Bacteria are by far the most abundant organisms in soils, with several thousand million cells present in a single gramme of most soils. Bacteria play important roles in the plant-soil system; firstly, by both fixing and transforming nutrients vital to other organisms, but also by influencing the overall ecology of the system through positive or negative biotic interactions with other organisms. They are able to grow rapidly and, therefore, can adapt rapidly to environmental change.

New data, new knowledge

In the past, our knowledge of the different types of bacteria found in soil, and the factors affecting their distributions, has been limited to findings from the analyses of culturable bacteria that can grow on nutrient-rich media in the laboratory. These findings are now being complemented by data from large-scale soil surveys using molecular techniques to assess biodiversity.

Drivers of soil bacterial diversity

A striking consistency in the many large-scale studies that have been performed is the overriding influence of soil properties on soil bacterial communities. Across landscape gradients, from upland bogs and woodlands through grasslands to intensive lowland arable systems, predictable changes occur in the broad taxonomic makeup of bacterial communities which can be related to changes in soil properties, such as acidity and organic matter content.

This biodiversity is made up of many previously undiscovered taxa, such as the acidobacteria, which are specialised for living in such physiologically harsh environments. In more neutral habitats, like those favoured for agriculture, there are more diverse assemblages of bacteria that are better-known due to culture-based studies.

Soil bacterial communities are also driven by plant diversity which provides the important raw detrital materials on which the microbial communities build the soil. In the short term, plants provide labile exudates from their roots, which feed the bacterial activities and the local diversity of communities. It is difficult, perhaps even impossible, to determine the relative importance of each of the different factors in driving soil biodiversity, because of their inherent interdependencies. However, because of the increasing demand for food production, one factor that is heavily altered by human populations is the plant communities. For this reason, there is a heightened interest in plant and agronomic effects on soil bacterial biodiversity. More modern advances in molecular sciences are now used to address these issues.

Farming Secrets says:* *Plant Diversity Drives Soil Bacterial Biodiversity

***Ref:* A Global Atlas of Soil Biodiversity p 69**