

Some trees 'farm' bacteria to help supply nutrients

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Some trees growing in nutrient-poor forest soil may get what they need by cultivating specific root microbes to create compounds they require. These microbes are exceptionally efficient at turning inorganic minerals into nutrients that the trees can use. Researchers from France report their findings in the July 2010 issue of the journal *Applied and Environmental Microbiology*.

"In acidic forest soils, availability of inorganic nutrients is a tree-growth-limiting factor. A hypothesis to explain sustainable forest development proposes that tree roots select [soil microbes](#) involved in central biogeochemical processes, such as mineral weathering, that may contribute to nutrient mobilization and tree nutrition," says Stéphane Uroz, an author on the study.

Certain microbes are efficient at breaking down [inorganic minerals](#) into nutrients. This process, called mineral weathering, is especially important in acidic forest soils where tree growth can be limited by access to these nutrients. Mineral-weathering bacteria can release necessary nutrients such as iron from [soil](#) minerals. This gives [trees](#) with increased concentrations of mineral-weathering microbes an advantage over other trees.

Distinct impacts of the tree species on the soil bacterial community structure have been previously reported, suggesting that the composition and activity of soil bacterial communities depend on tree physiology and notably on its impact on the soil physicochemical properties and nutrient cycling. However, no study has ever addressed the question of the impact of tree species on the structure of forest soil bacterial communities involved in mineral weathering.

"This question regarding the impact of tree species on the functional diversity of the bacterial communities remains a major issue in forestry,

especially in the context of today's climate change, which will give rise to a shift in the spatial distribution of forest tree species" says Uroz.

The researchers took soil samples from the root areas of beech, oak and Norway spruce trees and cultured them to determine the bacterial populations. They observed heightened levels of mineral-weathering bacteria in the samples near the roots of oak and beech trees compared to surrounding soil samples. This difference was not seen in the Norway spruce samples.

"Our results suggest that certain tree species have developed indirect strategies for mineral weathering in nutrient-poor soils, which lie in the selection of bacterial communities with efficient mineral weathering potentials" says Uroz.

Provided by American Society for Microbiology

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