CHEMICAL DIVERSITY OF SOIL LIPIDS REFLECTS SURROUNDING BIODIVERSITY IN A FRENCHPEATBOG
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Introduction

The spatial heterogeneity of molecular biomarkers preserved in soils and sediments, and their representativeness of the spatial distribution of the surrounding vegetation, are seldom taken into account in environmental or paleoenvironmental studies. Here we examine the distribution of lipids in peat soils in relation to their potential plant sources in the surroundings.

Sampling Site

La Guette peatland is located in Neuvy-sur-Bréloge (Sologne, Cher) in the French Centre Region (154 m a.s.l.; N 47°19', E 2°16'). This site covers 25 ha and is a transitional fen (pH about 4.4-5).

Specificity of biomarkers

We first explored lipid compounds that could be specific for distinct vegetation by comparing molecular imprints in soils with those of the surrounding plants.

Lipid Analyses

About 5 g of soil or plant sample were sonicated with CH2Cl2 (3 x 10 min x15 ml). Total extract was fractionated into neutral and acidic compounds using a sequence of solvents of increasing polarity. Alcohol fractions were aminopropyl-bonded silica. Neutral fraction was separated into five fractions respectively. Then, tree density (dtrees) and cover index (CI) were calculated.

Variability of molecular imprints in stations

We then compared the distribution of these lipid classes among soil samples in stations under varying vegetation cover.

Conclusions

- Pentacyclic triterpenyl acetates detected by Erica tetralixa and Calluna vulgaris were found in high concentrations in open stations.
- Tricyclic diterpenes and methoxy-serratene detected in Pinus sylvestris were found in high concentrations in semi-close and close stations dominated by Pinus sylvestris.
- Betulin derivatives detected Betula pendula were found in high amounts in semi-close and close stations dominated by Betula pendula.
- Non-specific compounds showed rather homogeneous distribution along the stations. Reversely, the spatial dispersion of specific compounds appears controlled by the surrounding vegetation.

For both P. sylvestris and B. pendula, our results indicate a strong relationship between the concentration of specific biomarkers in soils and tree density. This relationship is valid over an area of at least 80 m².

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- Concentration of B. pendula and P. sylvestris biomarkers in soils are well correlated with tree density when an area of 80 m is considered. Here, the influence zone is valid over an area of at least 80 m².

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