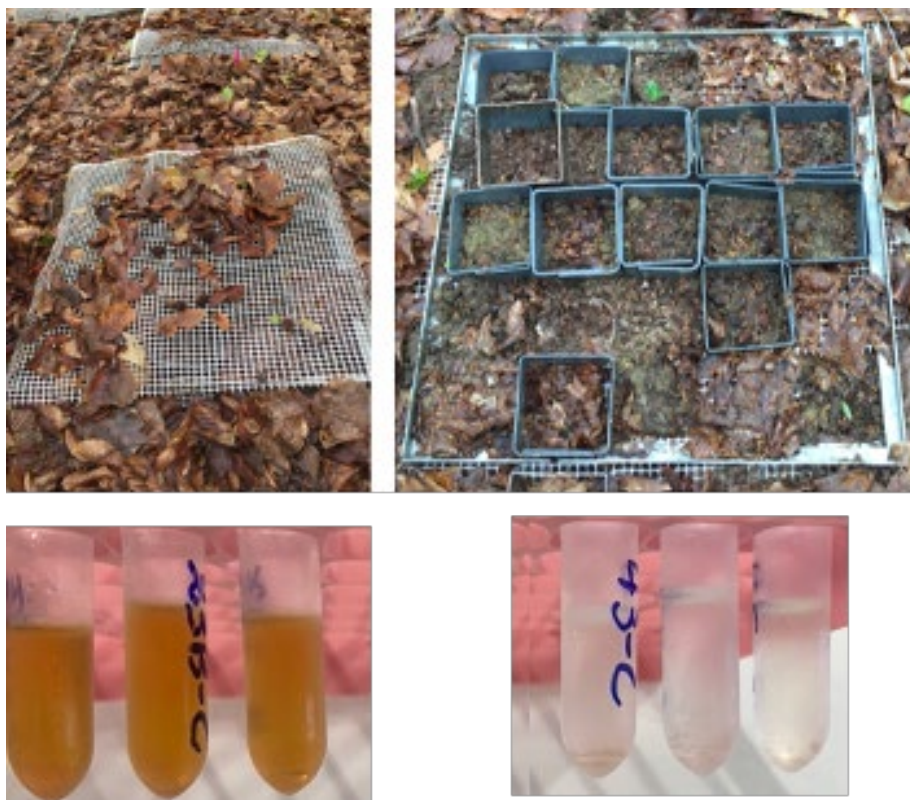


DECOMPOSE



DEcomposition of litter COMPOunds for a better constrain of Soil CO₂ Effluxes

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Thematic actions concerned: WP2 WP3

Context —

Heterotrophic respiration is a major and uncertain component of the carbon cycle at the forest ecosystem scale. Understanding how heterotrophic CO₂ efflux will respond to climate change is essential (Bond-Lamberty et al., 2016). Litter mineralisation is a major proportion of heterotrophic CO₂ efflux. Over the course of a year, the contribution of litter decomposition to CO₂ efflux will depend on temperature, soil moisture, carbon allocation in the tree, but also on the availability of carbon sources (the different compounds) during litter decomposition.

Objectives —

The objectives of the project were to (i) develop a technique for separating tree litter compounds, (ii) analyse their decomposition dynamics and (iii) assess their influence on soil CO₂ efflux.

Approaches —

We monitored in situ during 2.5 years the mineralisation of two litter labelled with carbon-13 either on structural compounds (cellulose, lignins, etc.) or on non-structural compounds (sugars, amino acids, etc.). Samples of marked litter were taken on 7 dates during this period. To identify which compounds were mineralised, we developed a method to determine the content and isotopic composition of the main litter compounds. The dynamics of the disappearance of the compounds and the evolution of their isotopic signature over the 2.5 years are being analysed and will be coupled with measurements of CO₂ efflux measured in-situ to identify the impact of the litter constituents on CO₂ efflux.

Key results —

- Analytical development to purify litter compounds is completed.
- The method for separation of litter compounds is validated.
- Separation and chemical and isotopic determination of compounds from different samples is in progress.

Main conclusions including key points of discussion —

As the biochemical and isotopic analyses of this project are still being acquired, it is difficult to draw any conclusions

Perspectives —

In the coming months we will determine:

- the degradation dynamics of each fraction and the loss of ¹³C linked to each compound.
- Using a model and the signature of the various litter products and meteorological and enzymatic data, we will model the influences of the fractions on the efflux of ¹³CO₂ in order to highlight the influences of litter mineralization on soil respiration.

Valorization — (scientific: publications, book chapter, presentation at conferences...); economic: Soleau envelope, patent, license...; distribution: press release, interview...)

A scientific valorization of the project is planned at the end of the project

Leveraging effect of the project—

None for the moment.