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# Responses of microbial degradation patterns of soil organic matter to a gradient of anthropogenic pressure on agrosystems

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## Context and Objective

Soil microbial functions involved in **nitrogen (N)** recycling and **carbon (C)** storage are shaped by human operations such as soil and crop managements and N fertilization. We aimed at characterizing the effects of the intensity of anthropogenic pressure on the **microbial patterns of soil organic matter decomposition**.

Gradient of anthropogenic pressure



Crop system	Treatment	Number
Crop rotations (6 years)	tillage, N+	Mons (T1) 1
	tillage, N-	Mons (T4) 2
	reduced tillage, residues recycled	Mons (T2) 3
	reduced tillage, residues exported	Mons (T3) 4
	tillage, N+	Lusignan (T1) 5
Crop (3 years)-meadow rotations	meadow 3 years, N+, mowed	Lusignan (T2) 6
	meadow 6 years, N+, mowed	Lusignan (T3) 7
	meadow 6 years, N-, mowed	Lusignan (T4) 8
	meadow 6 years, N+, mowed	Lusignan (TL3) 9
	meadow 6 years, legumes, grazed	Lusignan (TL6) 10
Permanent grassland	NPK, mowed	Theix (ID13) 11
	N-, mowed	Theix (ID11) 12
	NPK, mowed	Theix (ID20) 13
	N-, mowed	Theix (ID18) 14
	N+, 1 livestock unit	Laqueuille (Int) 15
	N-, 0.5 livestock unit	Laqueuille (Ext) 16



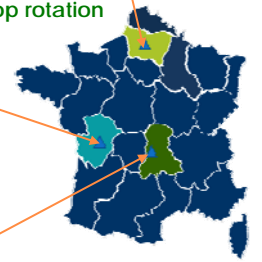
Lusignan: meadow-crop rotation



Estrées-Mons: crop rotation

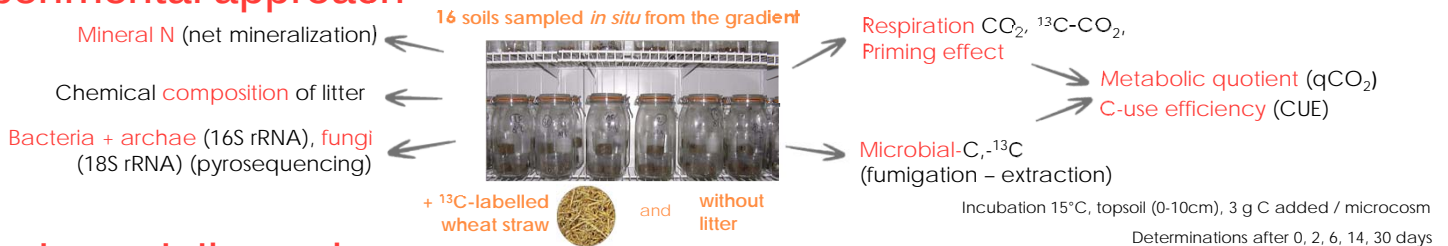


Theix-Laqueuille: permanent grassland

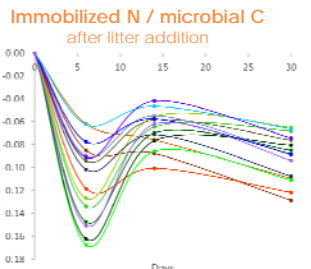
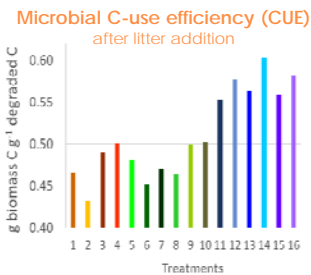
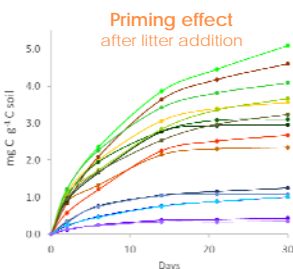
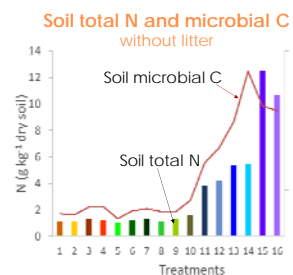


Long Term Ecological Research (LTER) network France

## Experimental approach



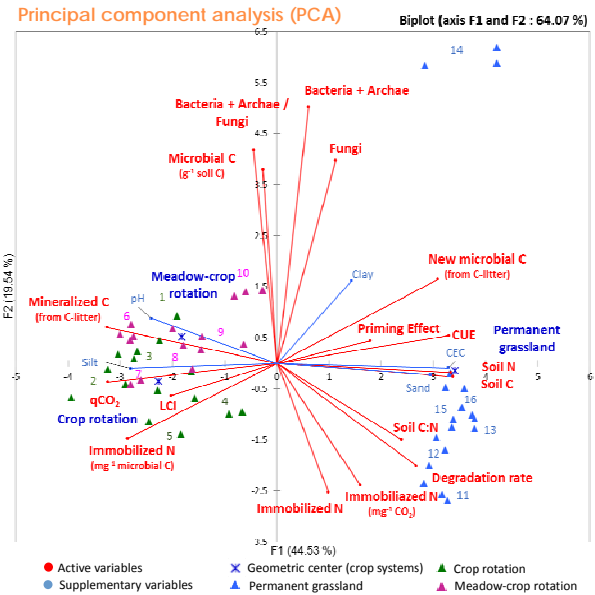
## Results and discussion



A marked gradient in soil C, N, C:N, microbial C was observed. CUE was the highest in permanent grassland.

Priming effect per unit of soil C was the highest in meadow-crop and crop rotations.

The amount of N immobilized per unit of new microbial C from litter was the highest in meadow-crop rotation.



**Permanent grassland:** microorganisms had the lowest rate of soil C mineralization and of priming effect per unit of soil C, and the highest production of litter-derived microbial C (CUE), i.e. a pattern of **strong potential to stabilize C**.

**Meadow-crop rotation:** microorganisms had the ratio soil-N immobilized-to-litter-derived microbial C the lowest, and caused the highest priming effect per unit of soil C, suggesting **higher nitrogen requirements**, and less stability of microbial communities.

The bacteria+archae-to-fungi ratio did not correlate with the anthropogenic gradient. However this gradient of anthropogenic pressure had a **strong influence of soil organic matter degradation functions**.