RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

FRANCE 2030 — PROGRAMME DE RECHERCHE CARBONE ET ÉCOSYSTÈMES CONTINENTAUX

CANETE FairCarboN

ANR-22-PEXF-0008

Soil microbial Carbon And Nutrient use Efficiency in managed Terrestrial Ecosystems (CANETE)

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L'INSTITUT agro Montpellier — UNIVERSITÉ DE LORRAINE — UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

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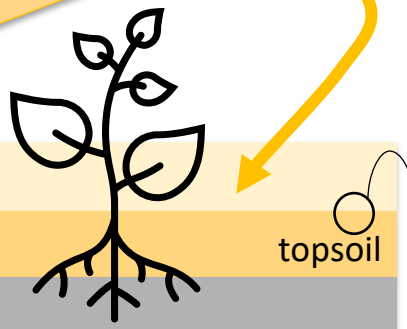
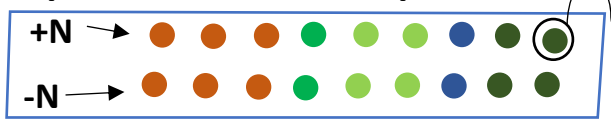
Project overview : soil microbial physiology contribution to C-N cycles

Environmental conditions & N nutrition management

Soil biotic legacy



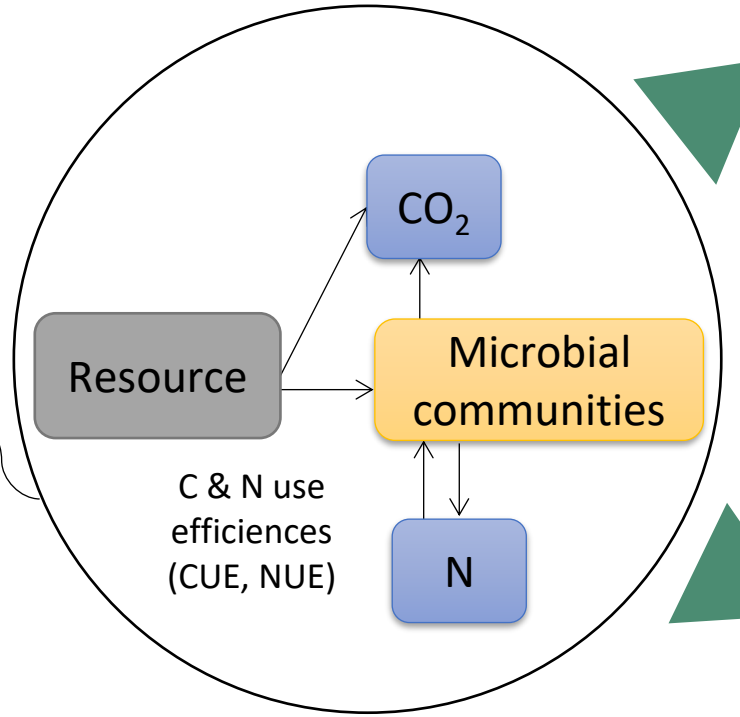
2 paired N treatment per site



9 Experimental sites

- Cropping system
- Temporary grassland
- Permanent grassland
- Agroforestry
- Forest

2023-2028



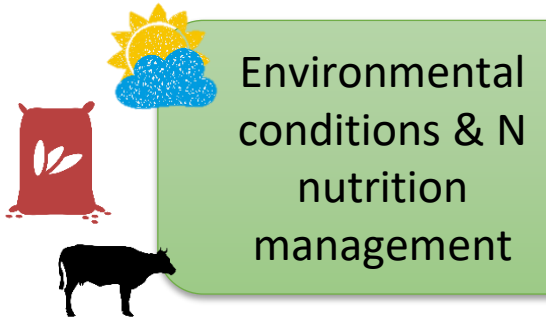
Microbiological (functional) mechanisms

Stabilization of C-N in soils

N availability and efficiency of N use by plants

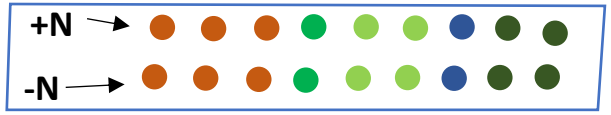
CANETE mixes : agricultural and forestry systems, experiments and modelling (mechanistic and predictive)

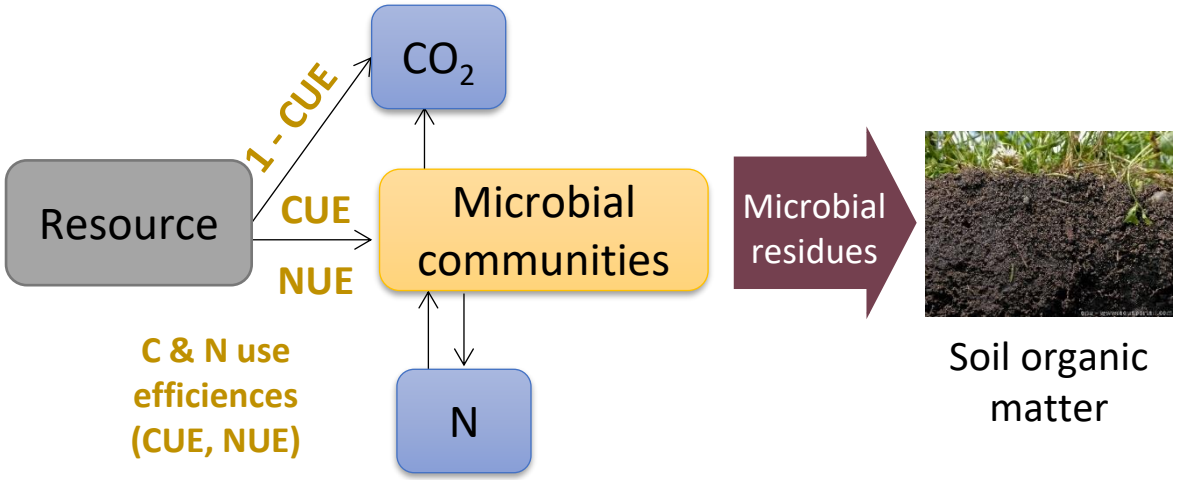
The “green” field campaign
spring 2025



Soil biotic legacy

2 paired N treatment per site





Soil organic matter

Long-term experiments (LTE) with practices and environmental conditions well defined : to provide **a snapshot** of the drivers and **microbial legacy**

Understand the **mechanisms**

Integrate new knowledge into **mechanistic models**

& the most significant regulations **into predictive models**

Look at the big picture of microbial efficiency **on soil functions**

The “green” field campaign: organization (2024)

Work with an external facilitator on aligning objectives/hypotheses/experiments and modeling implementation plan

Alexis Steiner – Collaborative innovation

Experimental strategy : assessment of propositions following a particular mindset

Pessimists

Factual (data)

Optimists

Proceduralists (height of vision)

The “green” field campaign: organization (2024)

A pre-campaign to test the feasibility (3 sites):

- staff required, material to be used
- Adaptation of the sampling protocol to soils & land uses
- Recovery time (fatigue) : one site a week

Collective preparation : actions / constraints / problem anticipation/ solutions

The same sampling team to ensure continuity + aid from the sites

Sample preparation centralization in the FARE lab

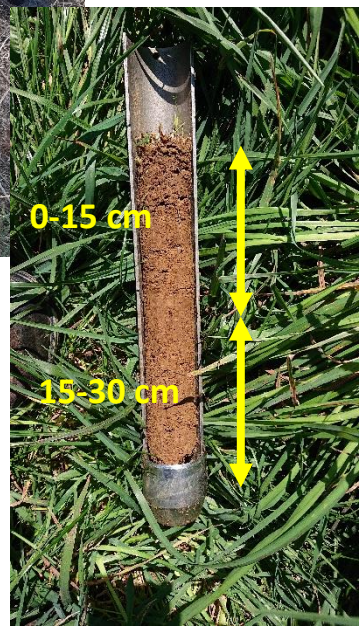
Sample shipping to the labs of the consortium

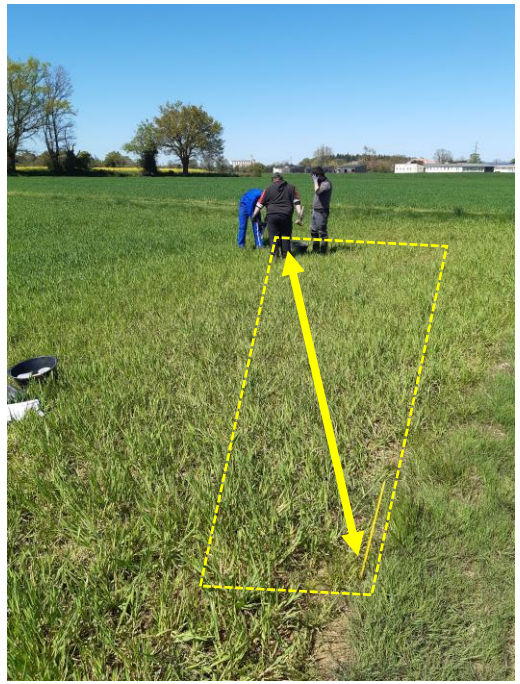
The “green” field campaign : sampling work (2025)

Soil cylinder for bulk density

Frame for forest floor

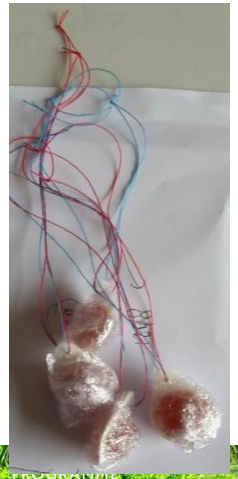
Soil sampling auger





Samples taken diagonally from a 10 x 5 m rectangle per block

Ion exchange resins



Location of the resins

1 composite sample ~6 kg per layer and block
X 4 (pseudo)-blocks

The “green” field campaign: Tour de France

Week 16

Week 17

Week 18

Week 20

Week 15

Week 19

Week 21

Week 14

Week 22

ACBB Estrées-Mons

Agro-TCR La Bouzule

Qualiagro PRO Feucherolles

CA-SYS Epoisses

Breuil-Chenue

ACBB Lusignan

ACBB Theix

ACBB Laqueuille

XyloSylve Pierroton

- Cropping system
- Temporary grassland
- Permanent grassland
- Agroforestry
- Forest

The “green” field campaign: sample centralization

Where?

In the « CANETE palace »

Thanks to the support of the President of the Grand Est region

The “green” field campaign: sample centralization

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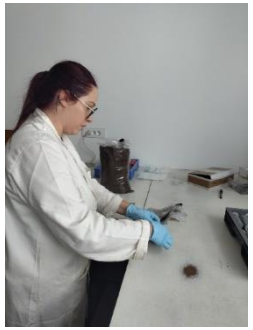


Aurore Flifti

Perle Bressan

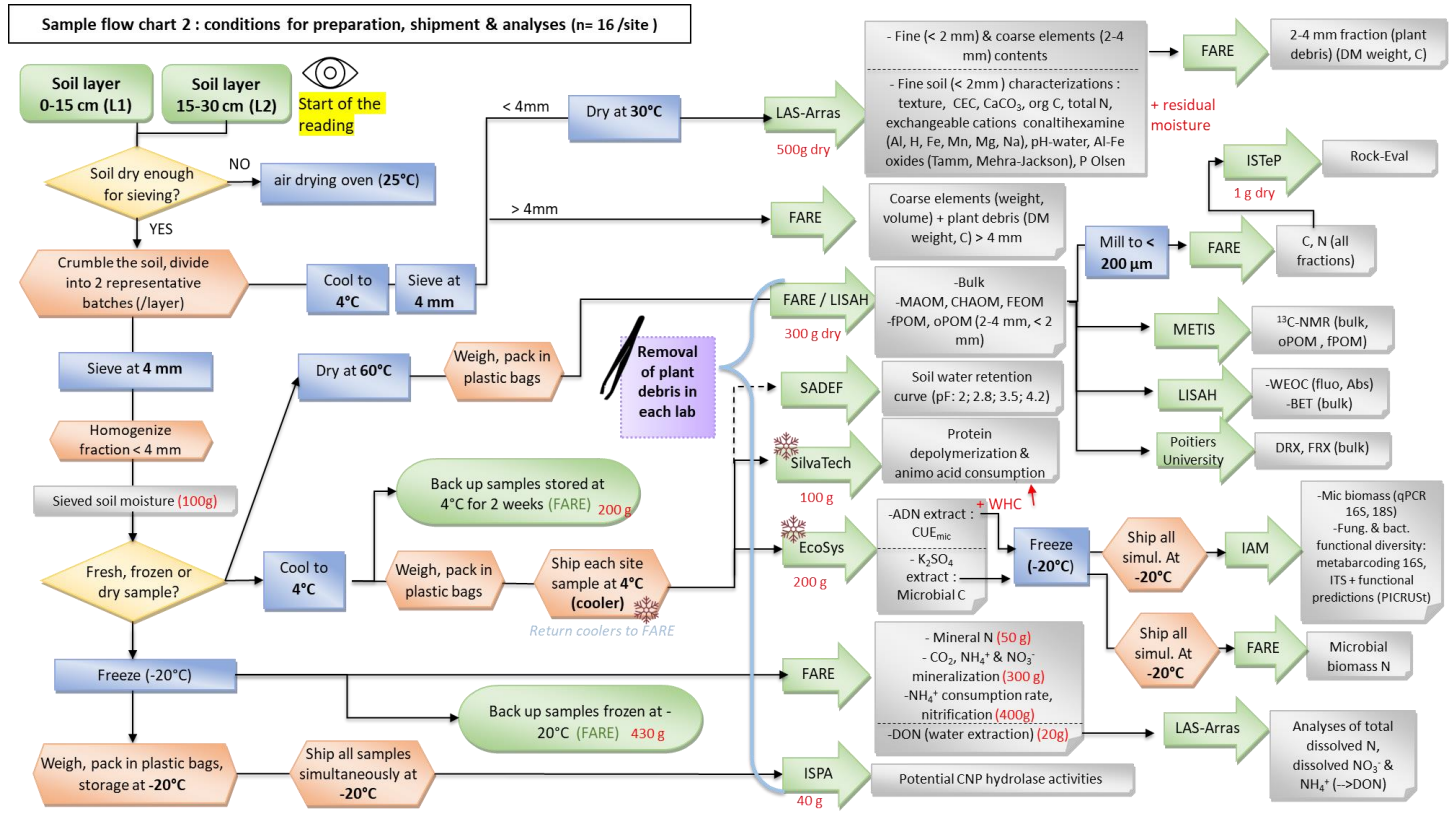
Preparation of 16 soil samples per week
9 consecutive weeks

Sieving 850 kg of soil to 4 mm

Weighing, packaging, shipping

The “green” field campaign: sample flow

Many analyses planned, with special mention for analyses on fresh soil samples



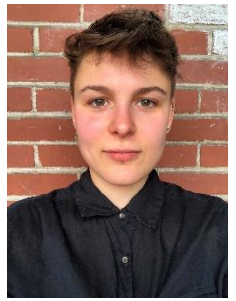
UMR ECOSYS

Biomass C,N
C-use efficiency
CUE (^{18}O-water)

Lydie Koffi

UMR Silva

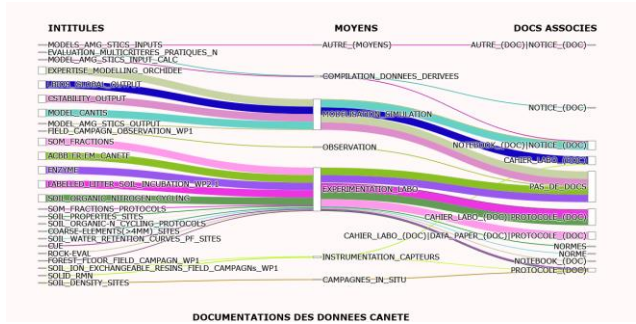
Protein depolymerization
^{15}N-amino-acid



Charlotte Stutzmann

Lastest news

- The schedule was intense but was maintained and went efficiently
- Collective work for the selection of 3 sites that will be more deeply analyzed
- We are now moving on to the fall (“brown”) and winter (“dark”) campaigns
- Work on the data has been initiated and will continue.
- Recruitment of 2 technicians, 2 engineers, 4 master students, 1 postdoctoral researcher and 2 PhD students.



N-use efficiency in terrestrial ecosystems subjected to different N management regimes

Poster

Mubarak Mahmud

Mineral and microbial controls of soil organic matter stabilization

Poster

Pierre Verjans

Modeling of microbial C- and N-use from organic matter in soil

Ana Paula Brandão

Steering community: Gwenaëlle Lashermes (**FARE**), Laurent Augusto (**ISPA**), Catherine Hénault (**Agroécologie**), Julien Fouché (**LISAH**), Marie Alexis (**METIS**), Hugues Clivot (**FARE**), Valérie Pot (**EcoSys**), Séverine Piutti (**LAE**), Delphine Derrien (**SAS**)

Colleagues in the consortium : Luiz Domeignoz-Horta, Tobias Bölscher, Clémentine Chirol, Claire Chenu, Valérie Pouteau (**EcoSys**) ; Guillaume Humbert, Ali Faraj, Angélique Gainvors-Claisse, Perle Bressan, Aurore Flifti, Olivier Delfosse, Pascal Thiébeau, Gonzague Alavoine (**FARE**); Julien Sainte-Marie, Nicolas Angeli, Loïc Louis, Cyndie Clément, Bastien Gérard (**Silva**) ; Nicolas Fanin, Pierre Trichet, Sylvie Milin (**ISPA**); Frida Keuper, Joël Léonard, Guillaume Vitte (**BioEcoAgro**); Fabien Ferchaud (**Eco&Sols**); Bertrand Guenet (**LG-ENS**); Nicolas Delpierre (**ESE**); Sixteen Cueff (**LISAH**); Marc Buée, Lucas Auer (**IAM**); François Baudin (**ISTeP**) ; Xavier Raynaud (**iEES**) ; Arnaud Legout, Bernhard Zeller (**BEF**); Maryse Rouelle (**METIS**)

Colleagues hired by the project : Charlotte Stutzmann (**FARE, Silva-Tech**), Mubarak Mahmud (**Agroécologie, ISPA**), Pierre Verjans (**FARE, LISAH**), Perle Bressan (**FARE**), Lydie Koffi (**EcoSys**), Hugo Lemoine (**LISAH, FARE**), Léo-Paul Charlet (**FARE**), Modou Mbaye MBow (**LISAH**), Emna Ben Gara (**FARE**), Ana Paula Brandão (**FARE, METIS**),

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FairCarboN : Patricia Garnier, Pierre Barré, Perrine Franquet, Claire Heitz, Jérôme Dutroncy