# An Overview of litter decomposition in soils for a diversity of agronomic and pedoclimatic contexts

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**Plant litter decomposition in soils** is a central process for agroecology by providing **plant nutrients (Nitrogen N, Phosphorus P)**, and contributing to the **carbon (C) stabilization**.

It is of paramount importance to manage this process according to the **agronomic, biologic, pedologic and climatic** factors that control it.

However, the scientific data accumulated over the past 30 years are **scattered** and **could be lost. Sharing** these data in **open access** is a way to **capitalize** on the research efforts.

The objectives of this project are to (i) **gather plant litter decomposition scientific data** obtained in controlled conditions, (ii) **describe** the data with the appropriate **metadata** to make them **understandable** and **re-usable**, (iii) **organize and harmonize** them, and (iv) **share** them in a **data warehouse** (Data INRAE).

## Methods

Dynamic data of **C, N and P** were collected in a **collection file. Litter biochemical characteristics** and **pedoclimatic data** are also associated. To ensure **data quality and understandability**, harmonization with thesaurus and **procedures of verification** were also set up. Data from the collection files were then transferred to **storage files** in **".csv" format** via **R scripts**. This allows **interoperability, accessibility and durability**. The R scripts are **documented and available for free access in GitLab**, as the collection file (https://gitlab.com/farelab/teamgl/collector/). Storage files are **available on Data INRAE repository** (https://data.inrae.fr/) with a "read_me" file, under a **CC BY license**.
A **data paper** is being published to **reference** the data, **describe** them and propose ways to **reuse** them (Fig. 1).
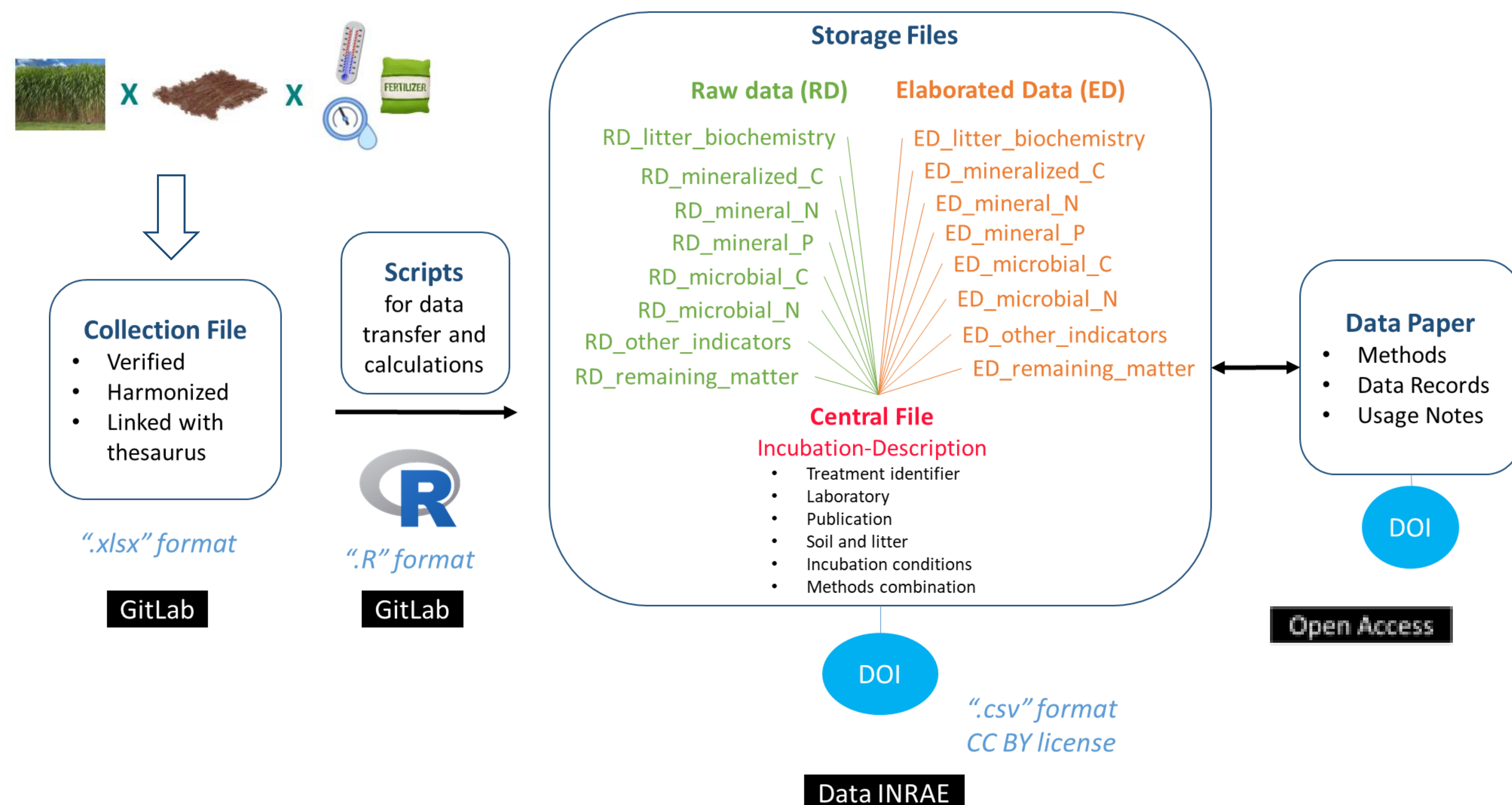


**Fig.1: Flowchart of the steps in the data processing and opening**

## Results

Final dataset contains **420 treatments**. **85%** of the collected data has been **published in a peer-reviewed journal**. **C mineralization** has been measured for **all the treatments** and **litter biochemistry** for **90%** of them. **75%** of the treatments also included **N dynamics** measurements and **20%** of them **microbial biomass** measurements (Fig. 3). About **50%** of the litter studied coming from **main crops** and about **15%** from **cover crops**. **Cover crop** litter covers **18 different species** (Fig. 2) and the dataset includes **a total of more than 50 different litter species**. Measurements from more of **30 soil sites** were collected across **20 countries over 5 continents** (Fig. 4). These soils also cover a **various range of texture** (Fig. 5).



**Fig.2: Litter origin (A) and species diversity in the data set for cover crop (B), and main crop (C)**
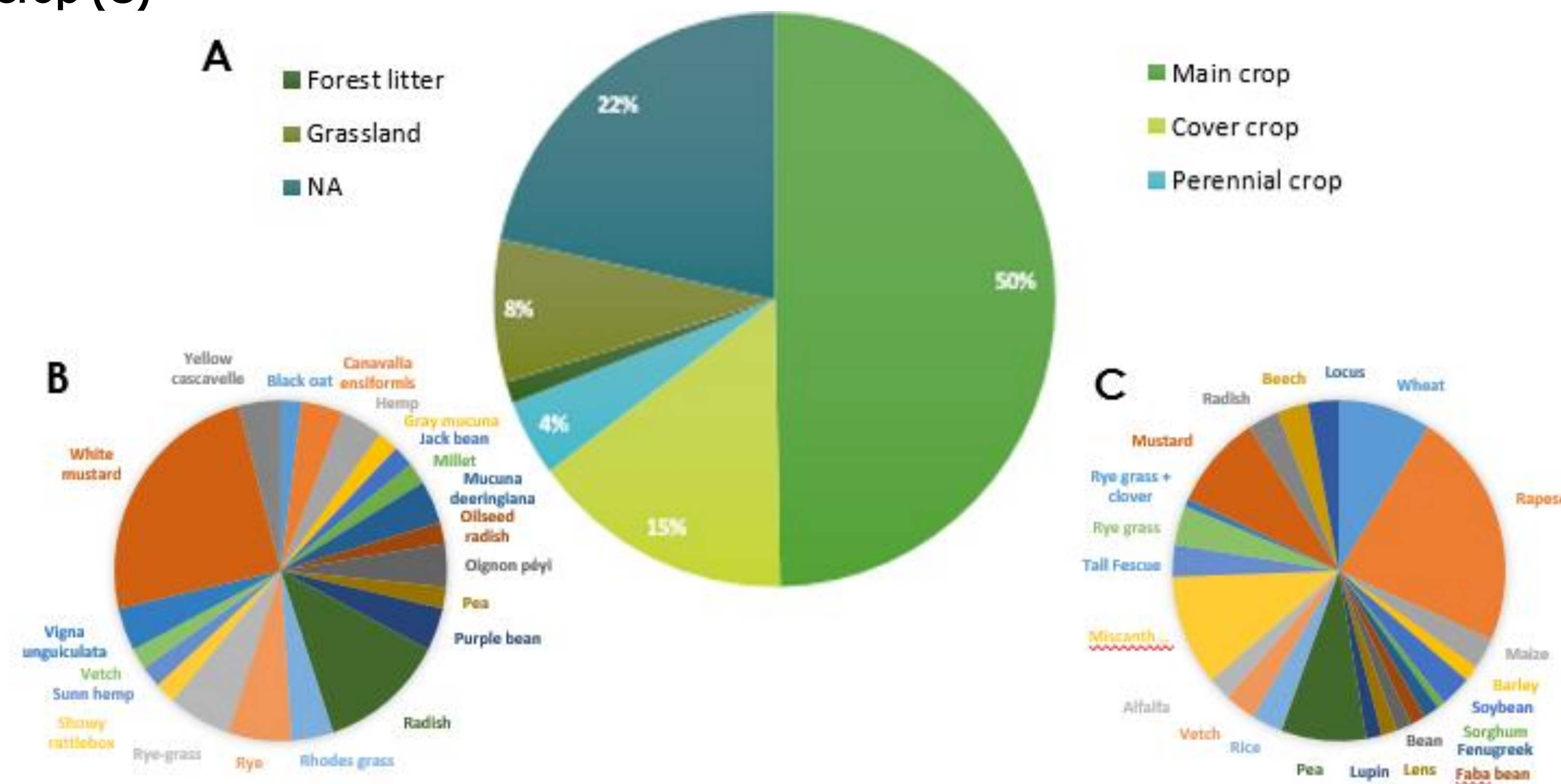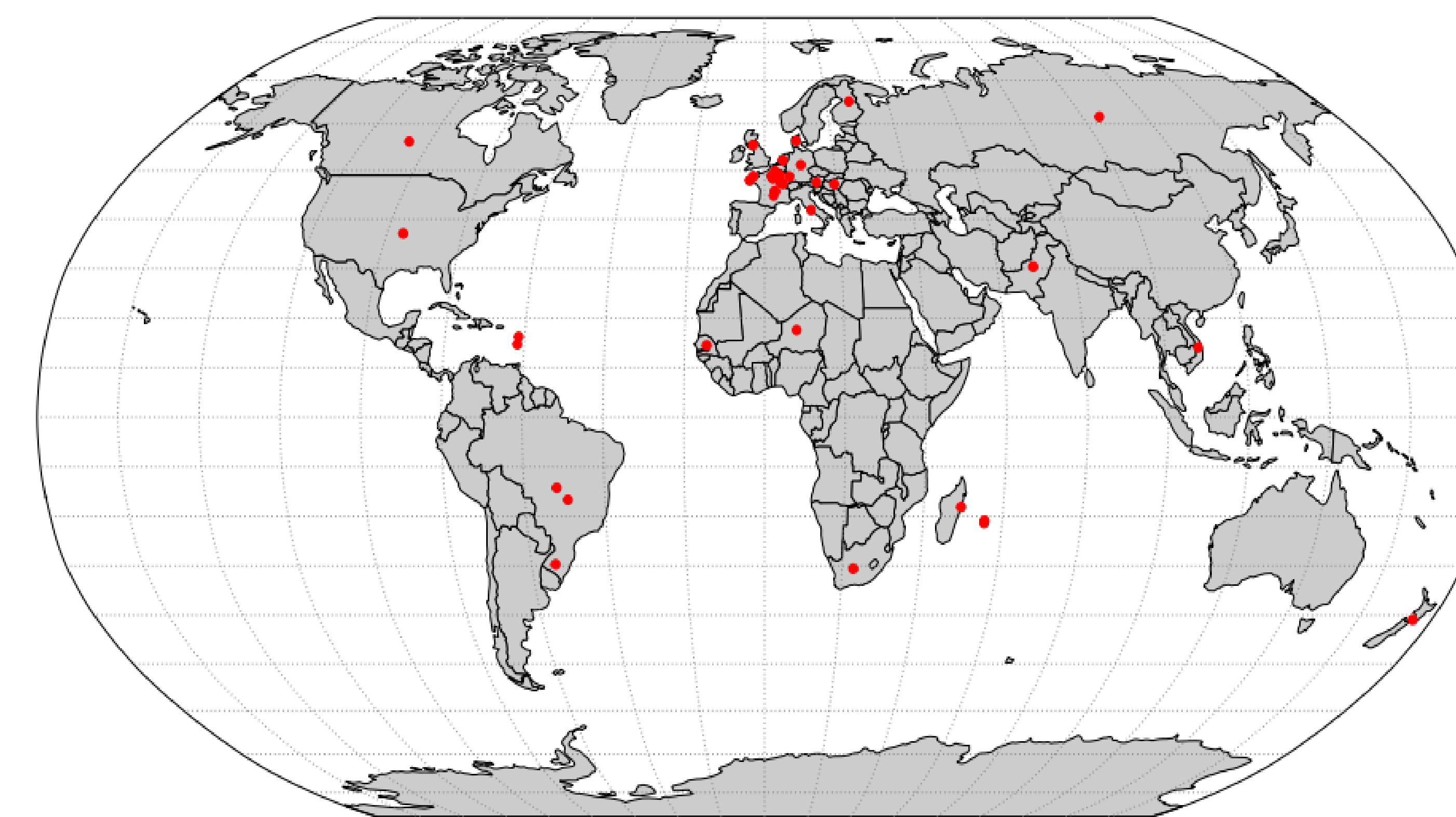


**Fig.3: Bar chart representing the percentage of treatment concerned by the different types of measurements made**



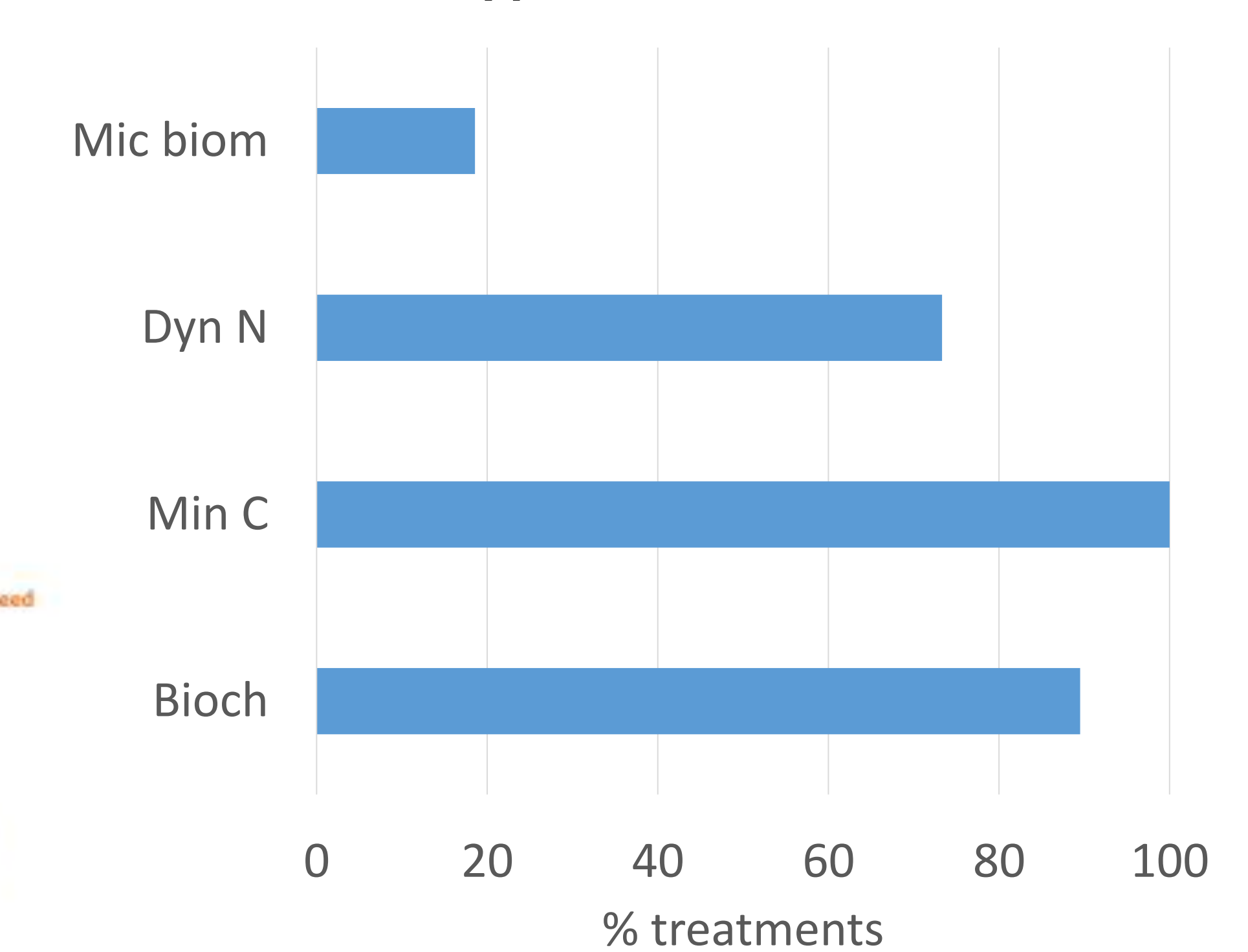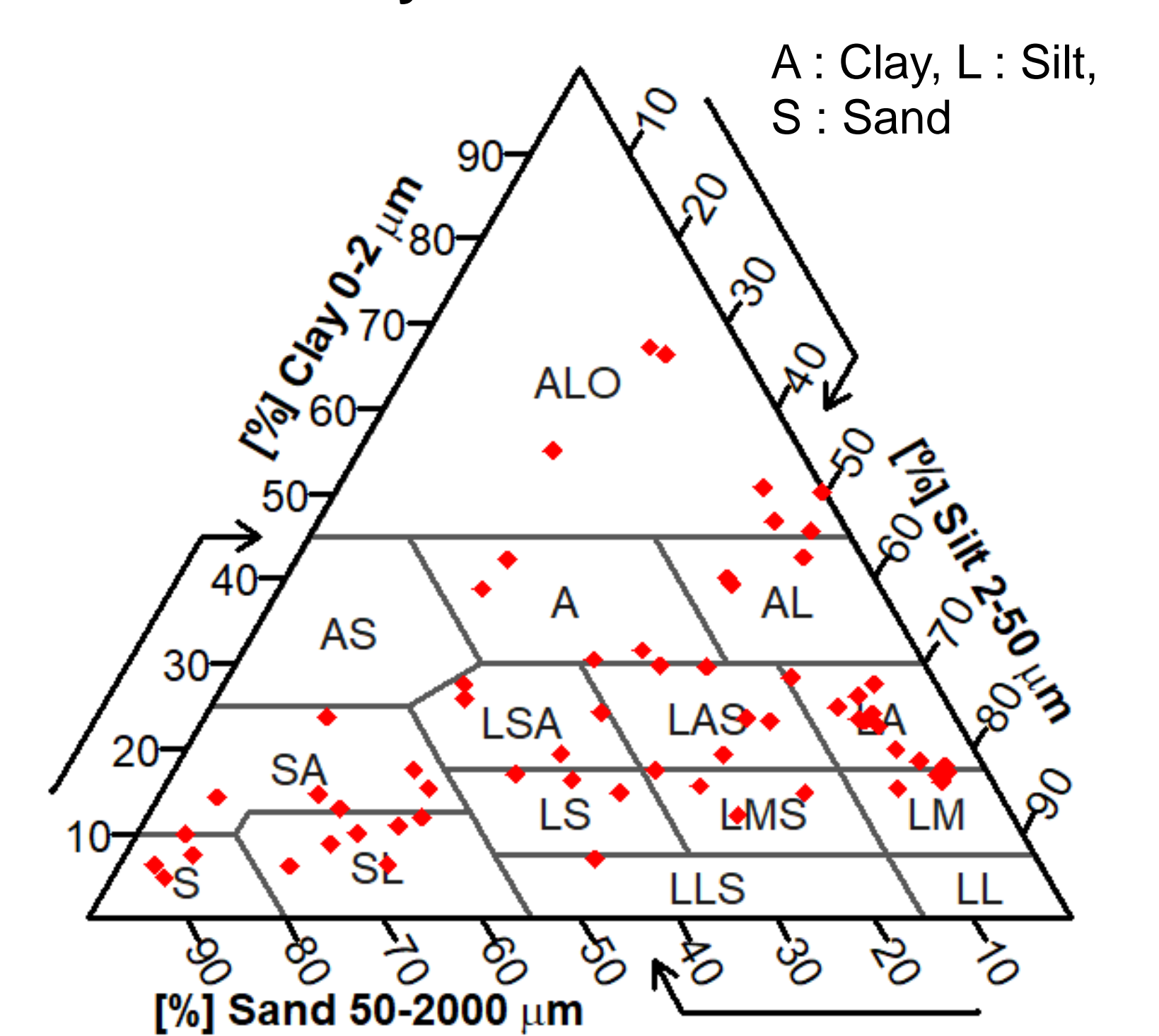**Fig.4: Location (in red) of the soils sampled for the incubation compiled in this dataset**



**Fig.5: Incubated soil texture diversity in this dataset**

A : Clay, L : Silt, S : Sand

The **capitalization** of the partner institutes and laboratories research efforts is made possible through the data valorization and optimization of their reuse. These data can be **reused for a meta-analysis, the calibration of digital tools** or the **acquisition of easily mobilized references** for the low-carbon labeling or revisions of IPCC methodologies for example. The approach implemented will be extended to **plant litter decomposition data acquired in the field** as well as to **organic waste products**.