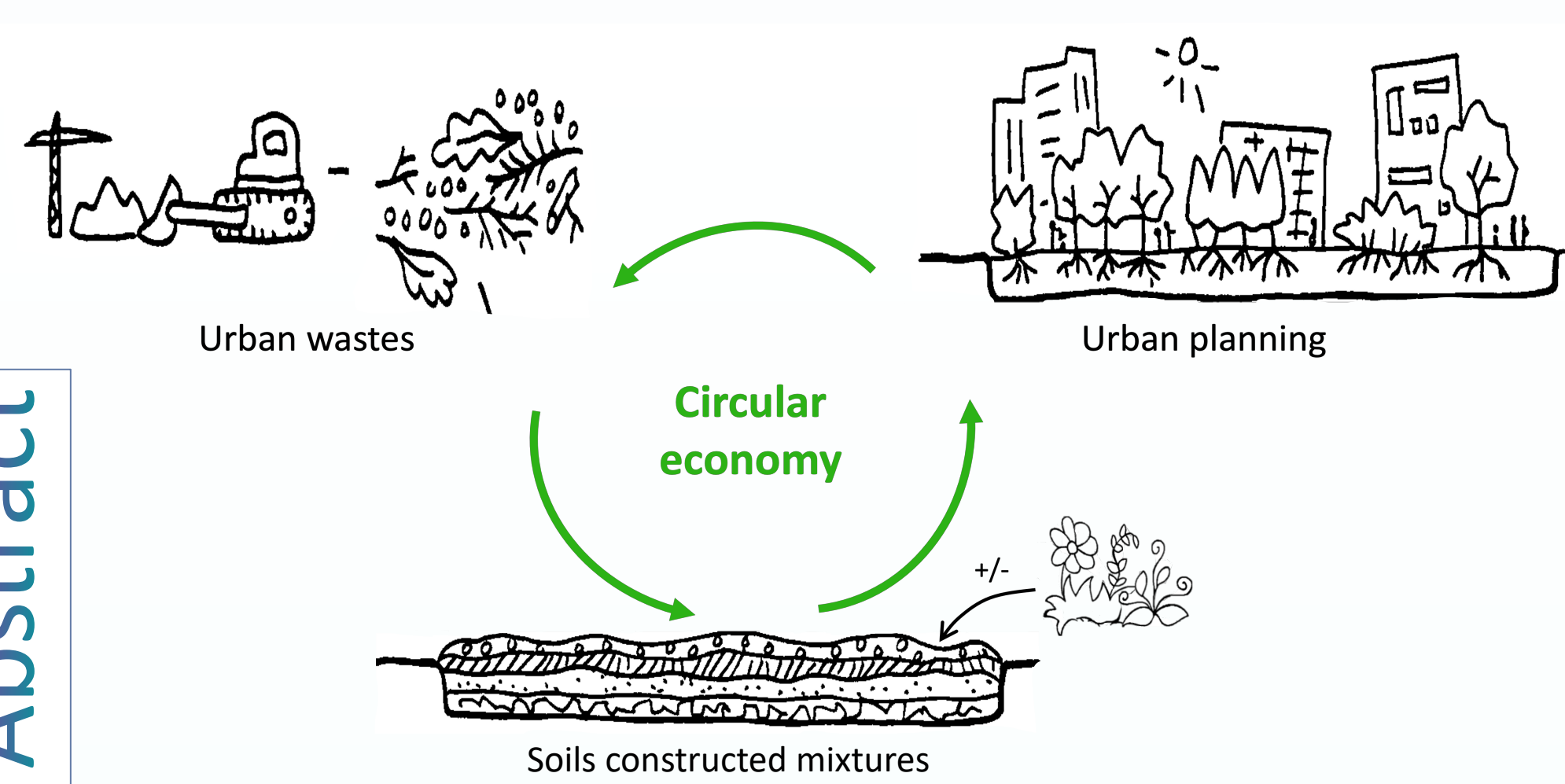


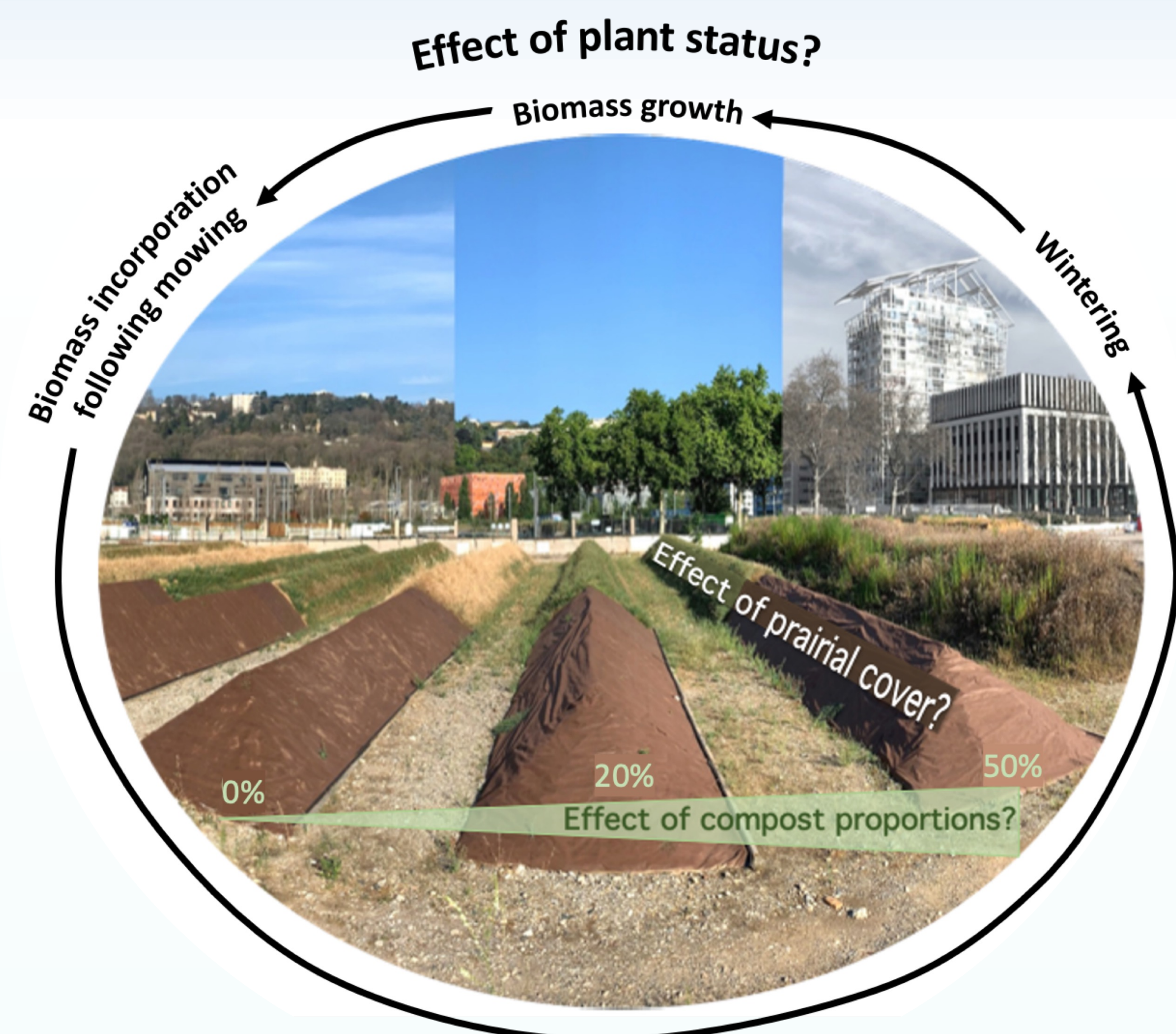
Durand, M., Legay, N., Le Guyader, N., Gervais, J., Czarnes, S., Pommier, T.

Abstract



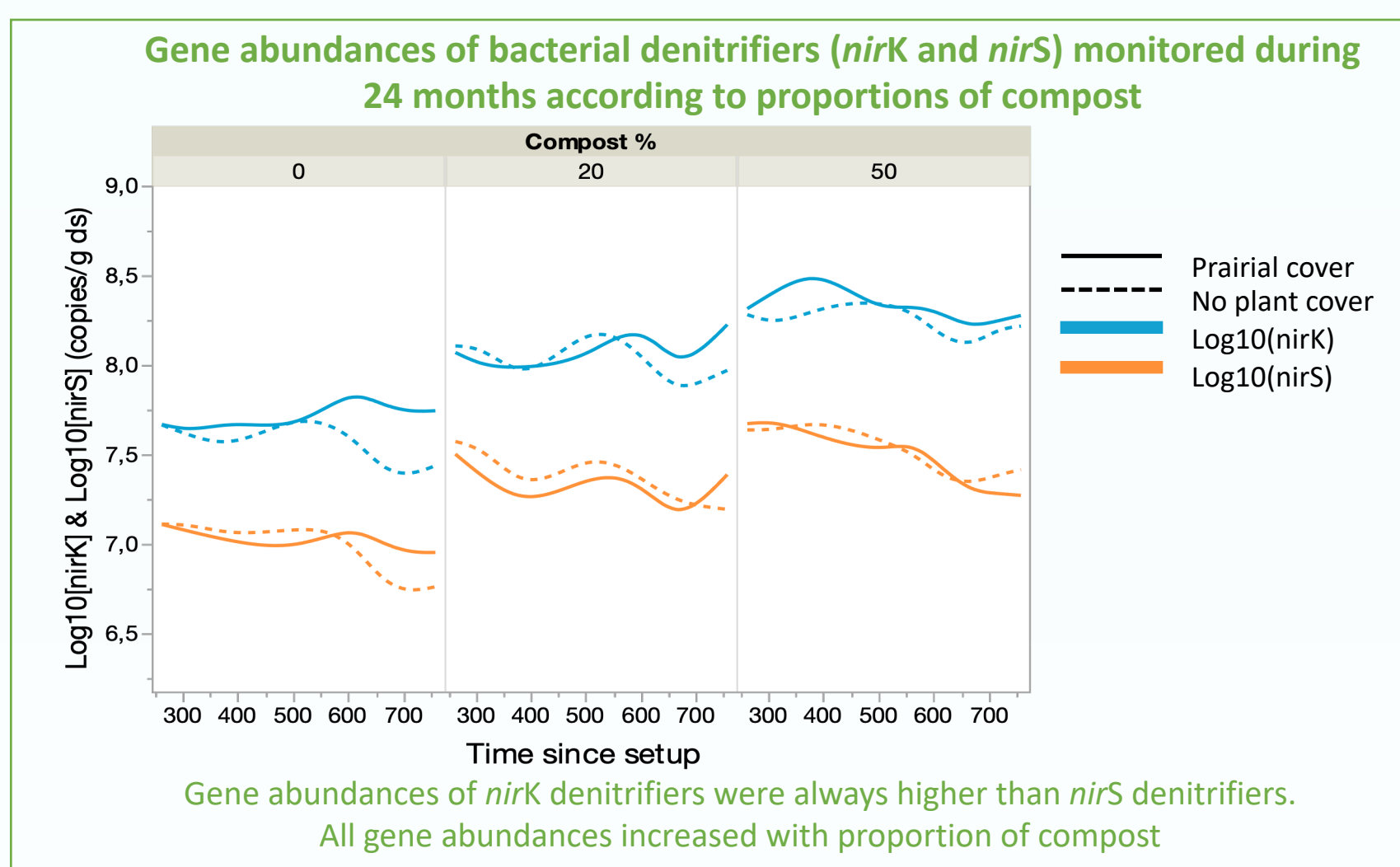
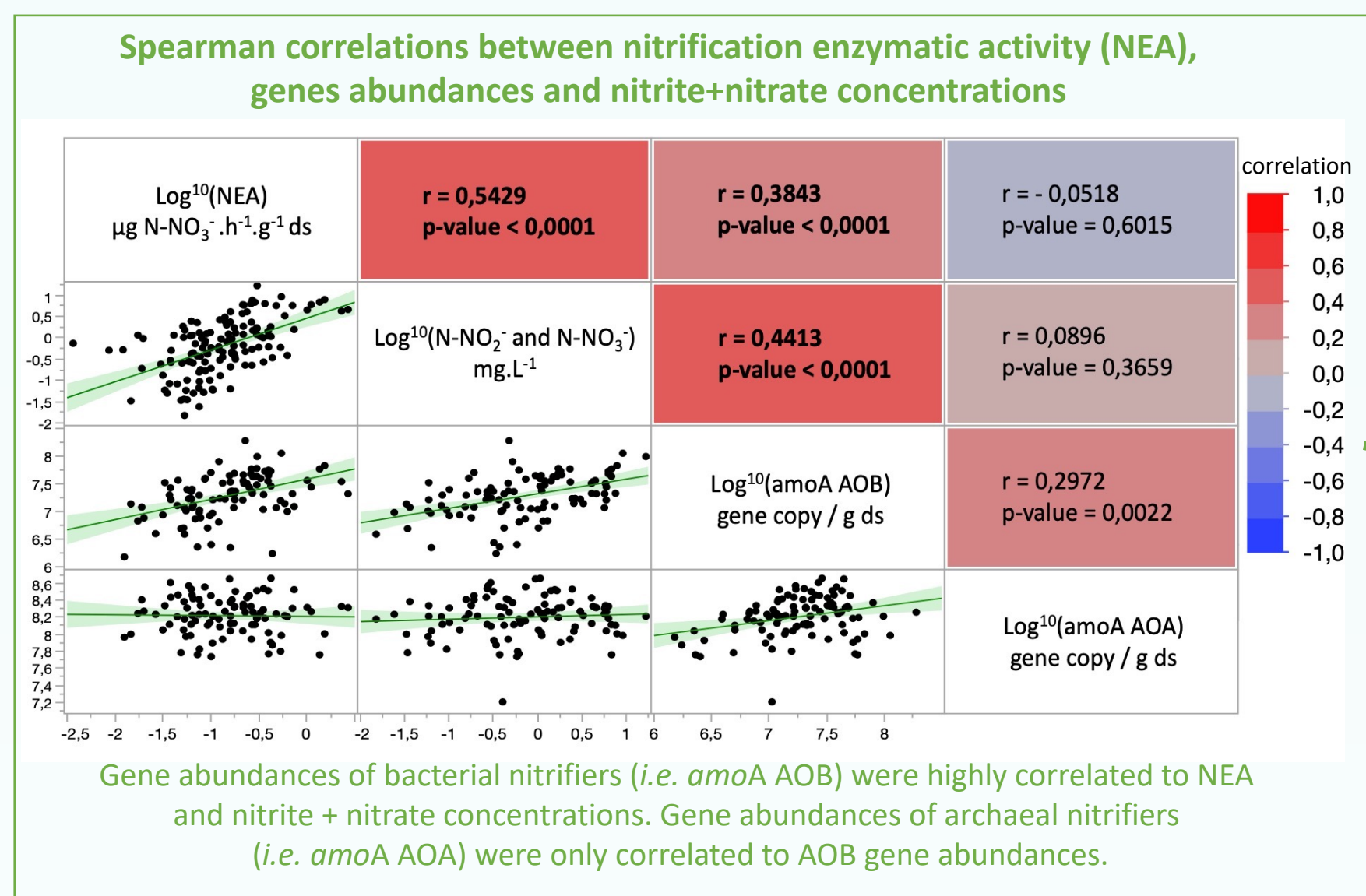
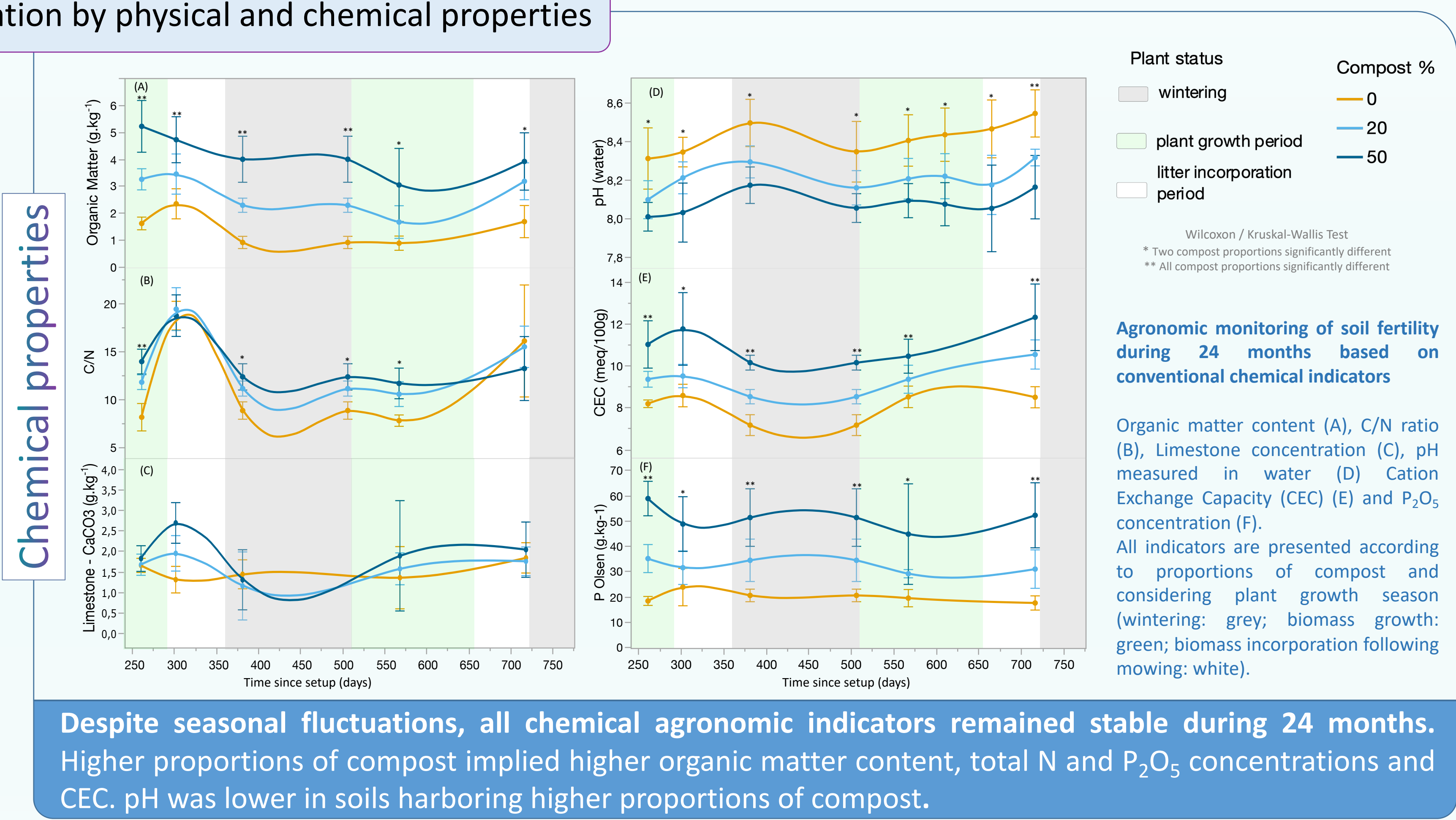
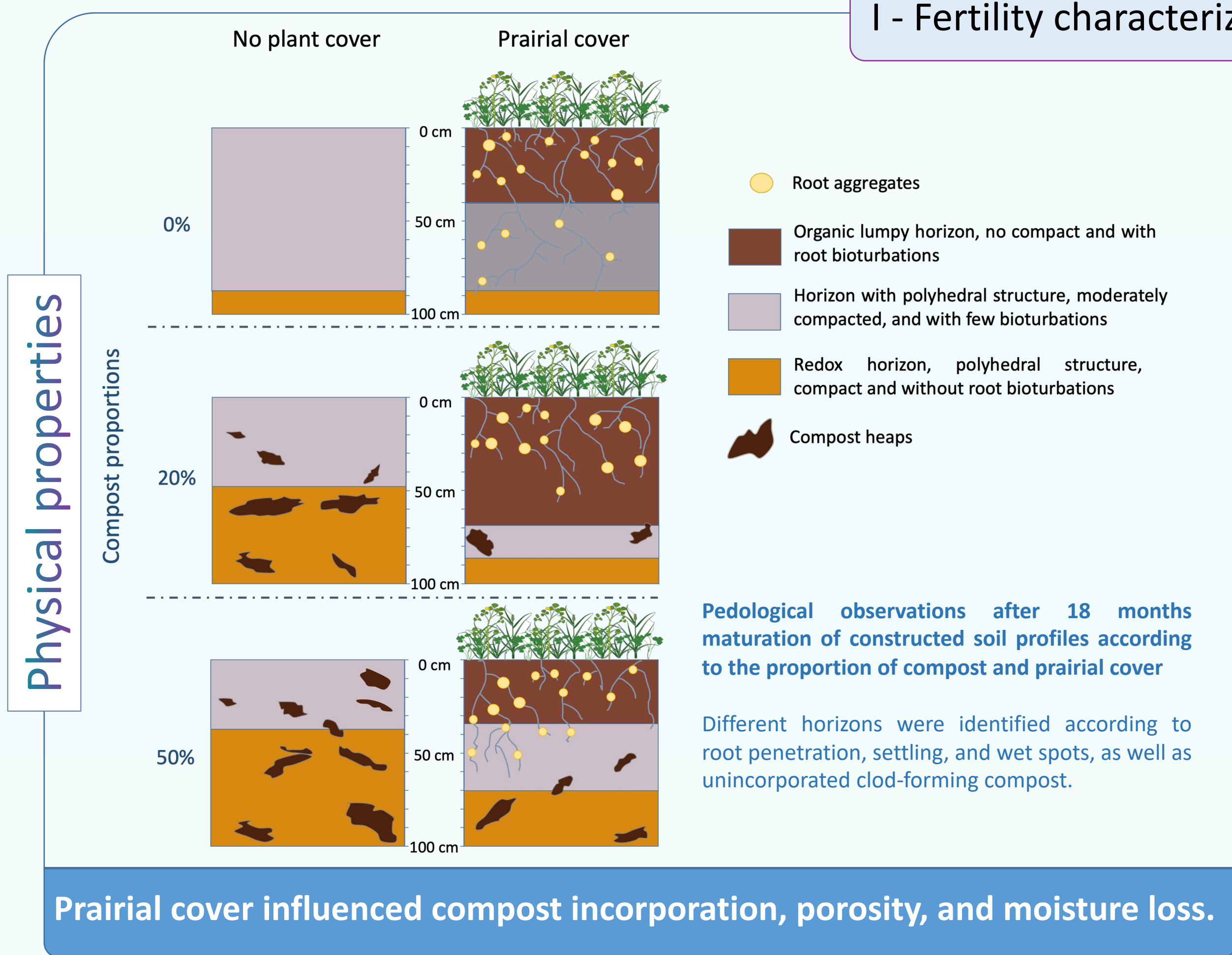
To address this issue, nine soils were constructed from compost, topsoil, and deep soil mixed in different proportions. Half were hydroseeded once with a mixture of annual and perennial plants. We then monitored soil fertility for 24 months, to cover two growing and two wintering seasons, and assess N cycle seasonality in regards of plant community development and pedological and chemical characteristics. Free-living microbial N-fixation, nitrification and denitrification enzyme activities were measured in soil incubations following acetylene reduction assays, colorimetric quantifications of nitrite/nitrate accumulation, and N<sub>2</sub>O gas chromatography, respectively. Relative abundances of genes associated to these enzyme activities were assessed using targeted quantitative PCR.

Our results suggest microbial indicators of soil functioning are truly relevant to monitor biological fertility of constructed soils in urban ecosystems.

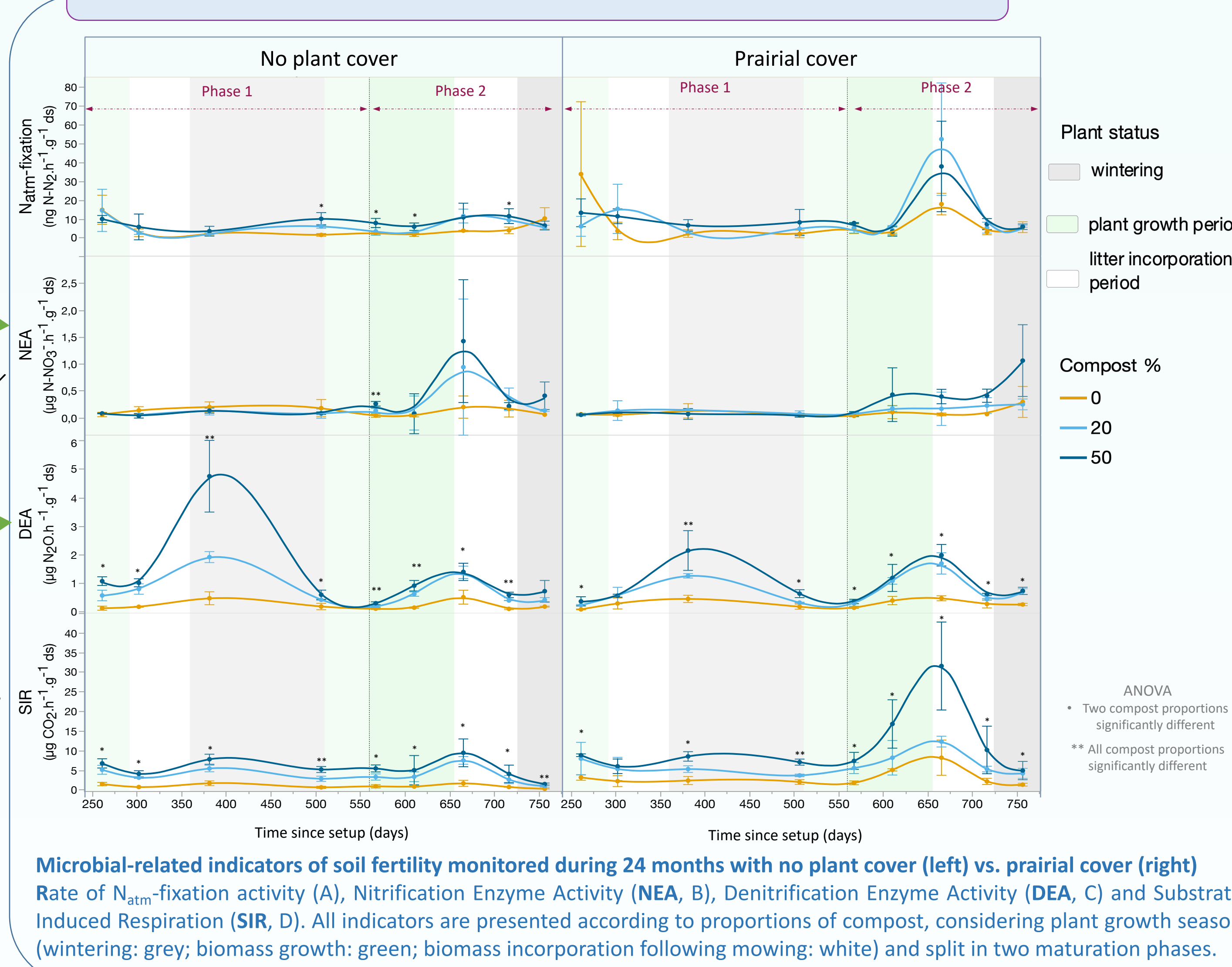


**Overall experimental setup and associated questions to assess the optimal conditions favoring compost-soil mixtures destined for urban greening.**  
The soil piles were built in La Confluence area in Lyon, France to be directly used during neighborhood rehabilitation. They were kept for maturation and scientific monitoring from November 2019 to March 2022 (24 months).

## I - Fertility characterization by physical and chemical properties



## II – Biological fertility characterization by microbial activities



### Two maturation phases

Rates of NEA, N<sub>atm</sub>-fixation and SIR enzymatic activities remained low during the first 18-month maturation (phase 1), and drastically increased after (phase 2), especially under prairie cover for N<sub>atm</sub>-fixation (at 665 days) and SIR (from 610 to 756 days).

### Prairie cover decreased rate of DEA (phase 1)

Suggesting a competition between plants and denitrifiers for the nitrate resource

### Addition of compost increased heterotrophic activities (i.e. DEA and SIR)

## Conclusion

**Agronomic indicators**, usually monitored for soil fertility, showed **no significant difference** during 24-months maturation, but some of them underlined the effects of proportions of compost and prairie cover.

**Microbial properties** more precisely showed the soil maturation phases:

- Initial materials effect : with heterotrophic microbial activities (DEA, SIR and to a lower degree N<sub>atm</sub>-fixation)
- Plant cover benefits : on all microbial activities at different levels
- Soil N-availability better disclosed by NEA
- AOB –nitrifiers gene abundance could reveal variations in NEA
- Best time to setup : when N-enrichment activities were higher

