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Introduction :

1. Carbon sequestration is very important to mitigate climate change.
2. Grassland can stock more carbon in their soil than forest or crops Fertilization affects the carbon stock, with organic fertilization and mineral fertilization leading to different levels of carbon.
3. Increase in soil carbon might come from different processes, direct input of carbon, an increase of litter restitution, and rhizodeposition.

Increase of carbon soil stock 0-15cm :

- All fertilisation modalities lead to an increase in soil carbon.
- Compost lead to the most important stock carbon increase of the Carbon stock, up to 2.77 MgC/ha/an.
- Mineral fertilisation lead from 0.29 to 0.63 MgC/ha/an soil carbon increase in the 0-15cm .
- Surface carbon stock increase more in the arenosol than that in the andosol.

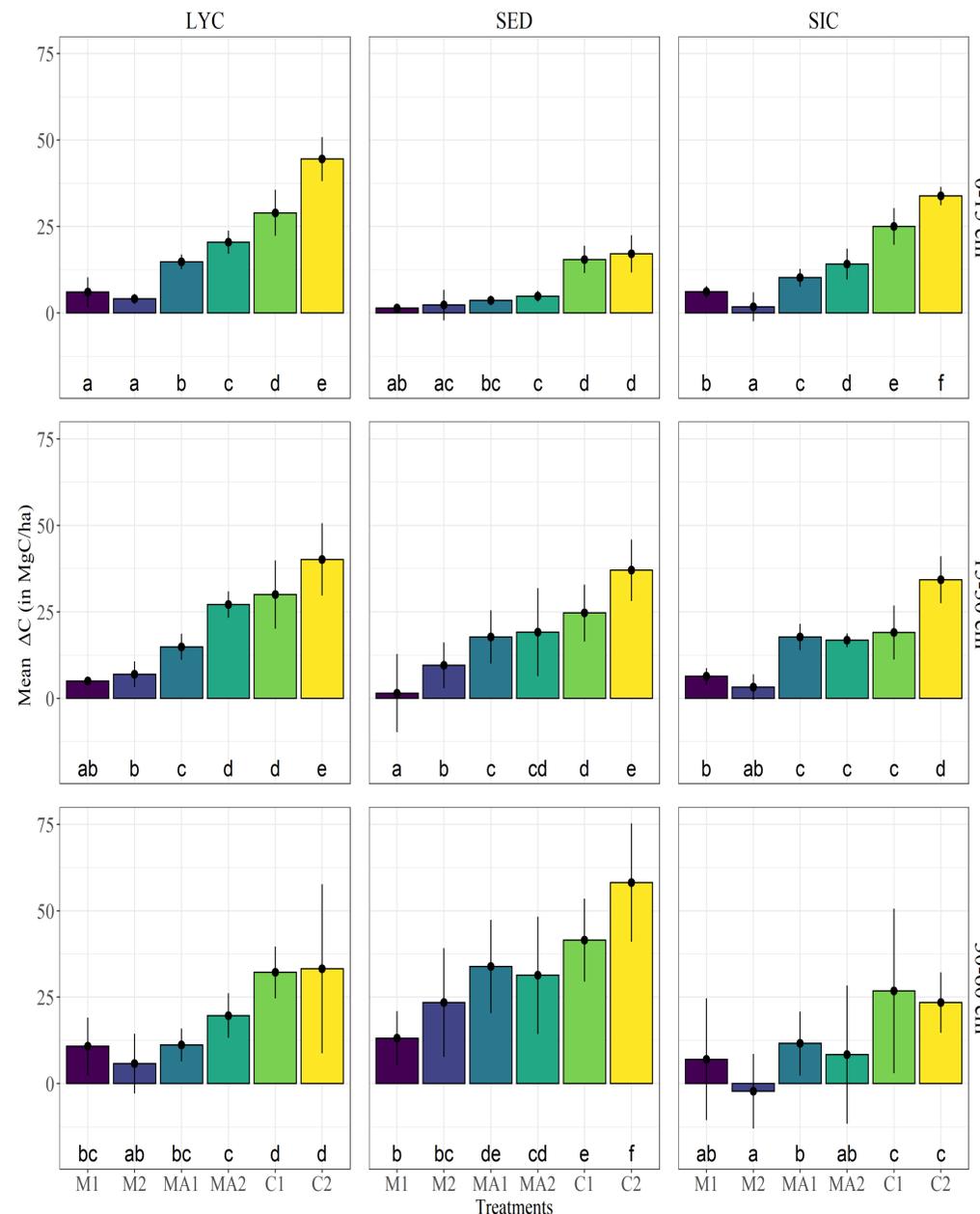
Long-term Fertilisation experiment :

1. 15 years fertilisation on tropical permanent grassland.
2. Fertilisation at each cut, 6 cuts per year.
3. Organic (liquid manure and compost) and mineral intensive fertilisation.
4. One poor carbon arenosol (LYC) and two rich carbon andosol (SED and SIC).

	LYC	SED	SIC
Soil Types	Arenosol	Andosol	Andosol
Most Common Species	<i>Chloris gayana</i>	<i>Pennisetum clandestinum</i>	<i>Dactylis glomerata</i>

Treatment	Rate per ha per cut
Control	No fertilisation
M1	70kg Ammonium nitrate
M2	120kg Ammonium nitrate
Ma1	40m3 Liquid Manure
Ma2	70m3 Liquid Manure
C1	7.2t Compost
C2	12t Compost

Increase of carbon soil in deep soil layer :



- A large portion of the carbon stock increase occurs in deep soil layer (30-60cm).
- At the SED andosol most of the carbon increase (60%) occurred below 30cm.

Discussion :

- Main carbon stock increase was attributed to the carbon input.
- Rise in soil carbon even occurs for mineral treatment indicating that the rise in productivity leads to carbon stock increase.
- A large portion of the carbon soil increase can occur in depth.

Highlights

- (1) Organic and mineral fertilization increases soil carbon stocks
- (2) Carbon storage is still increasing after 15-years of intense fertilization
- (3) Fertilisation indirectly increase soil carbon stock through rising in plant productivity
- (4) The major carbon source remains the direct organic C input
- (5) A large portion of soil carbon stock increase is observed in deep soil layer

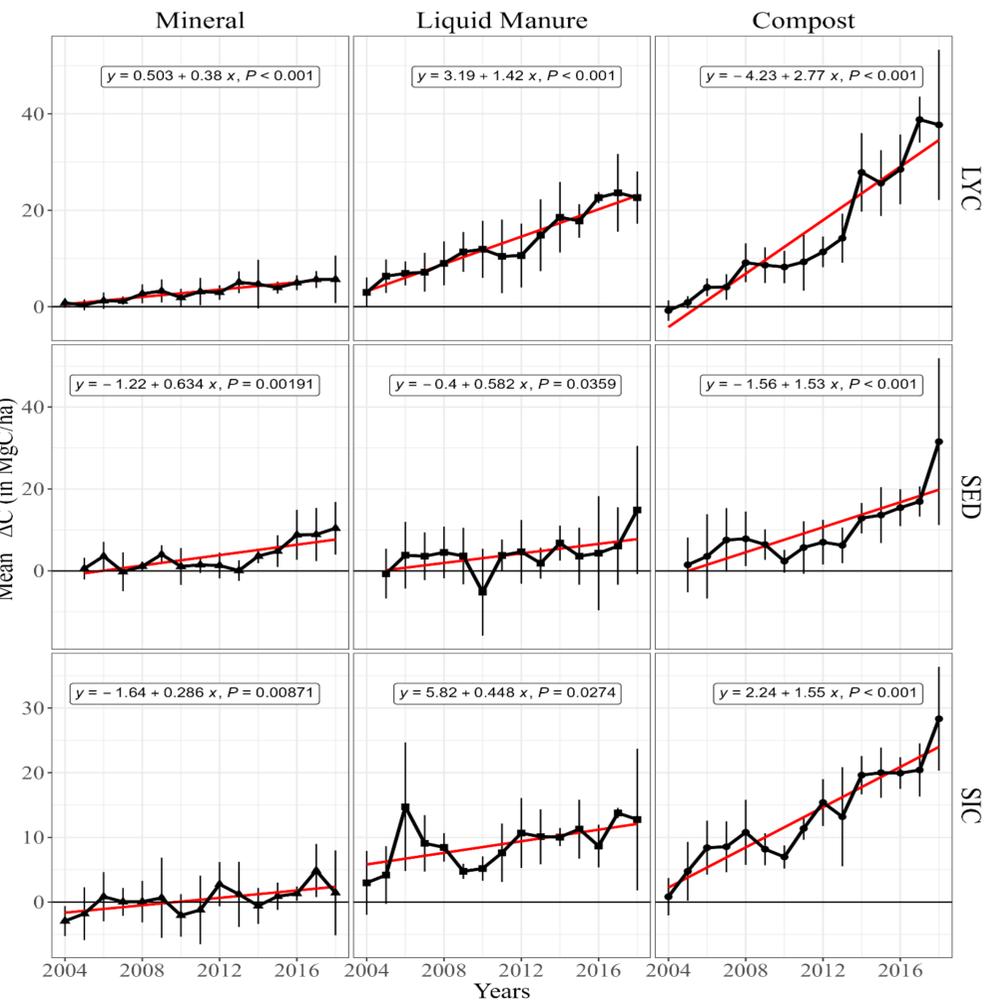


Figure 1: Evolution of the Mean difference in carbon stock between the considered modality and the control one, in the 0-15cm soil layer (ΔC in MgC/ha) for M2, Ma2 and C2 treatments at the different sites for the whole 15-years experiment.

Figure 2: Final Mean difference in Carbon stocks between the considered modality and the control one, in the three different soil layers (ΔC in MgC/ha), for the M1, M2, Ma1, Ma2, C1, and C2 treatments at the different sites after the 15-years experiment. Different letters indicate significant difference