

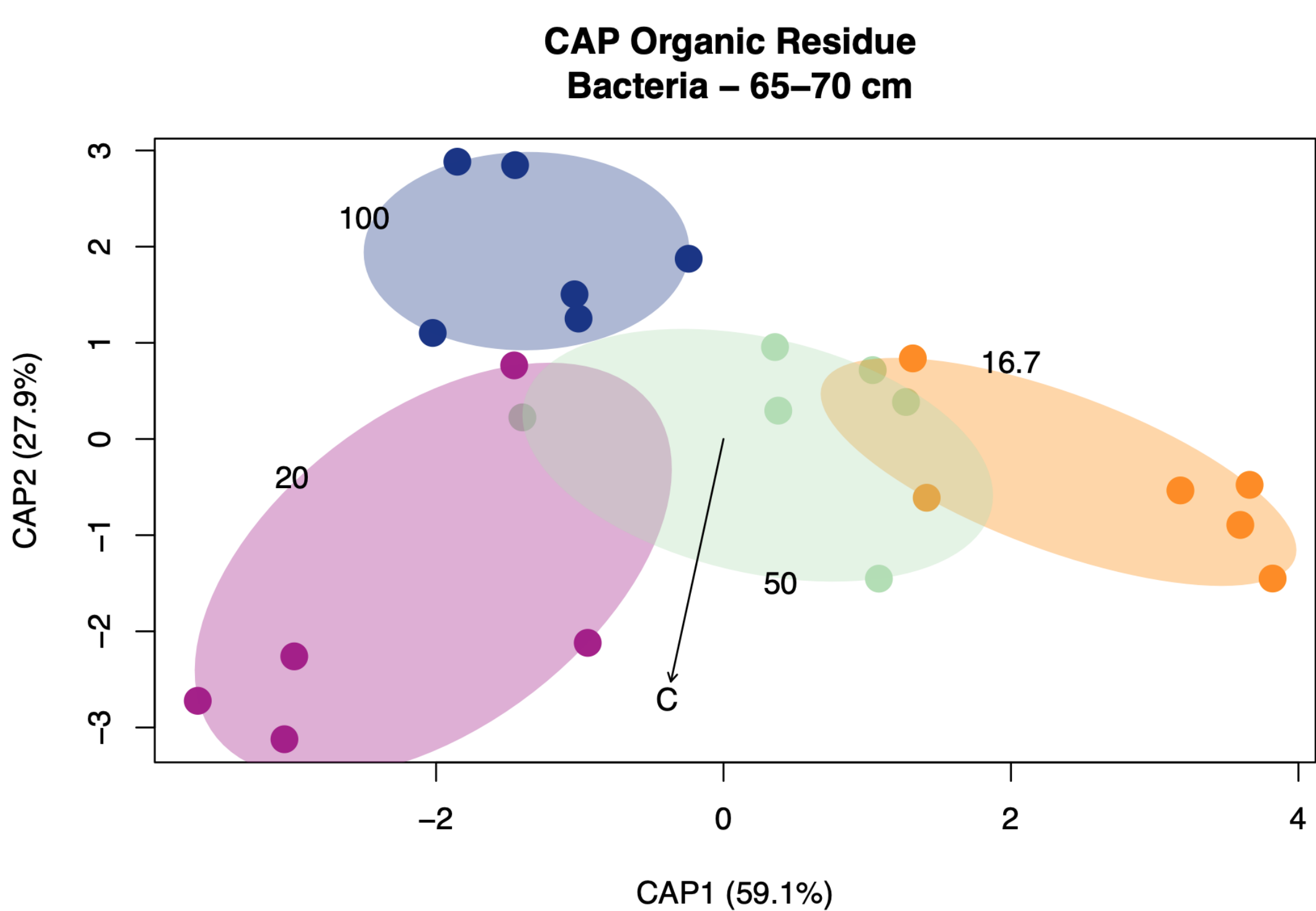
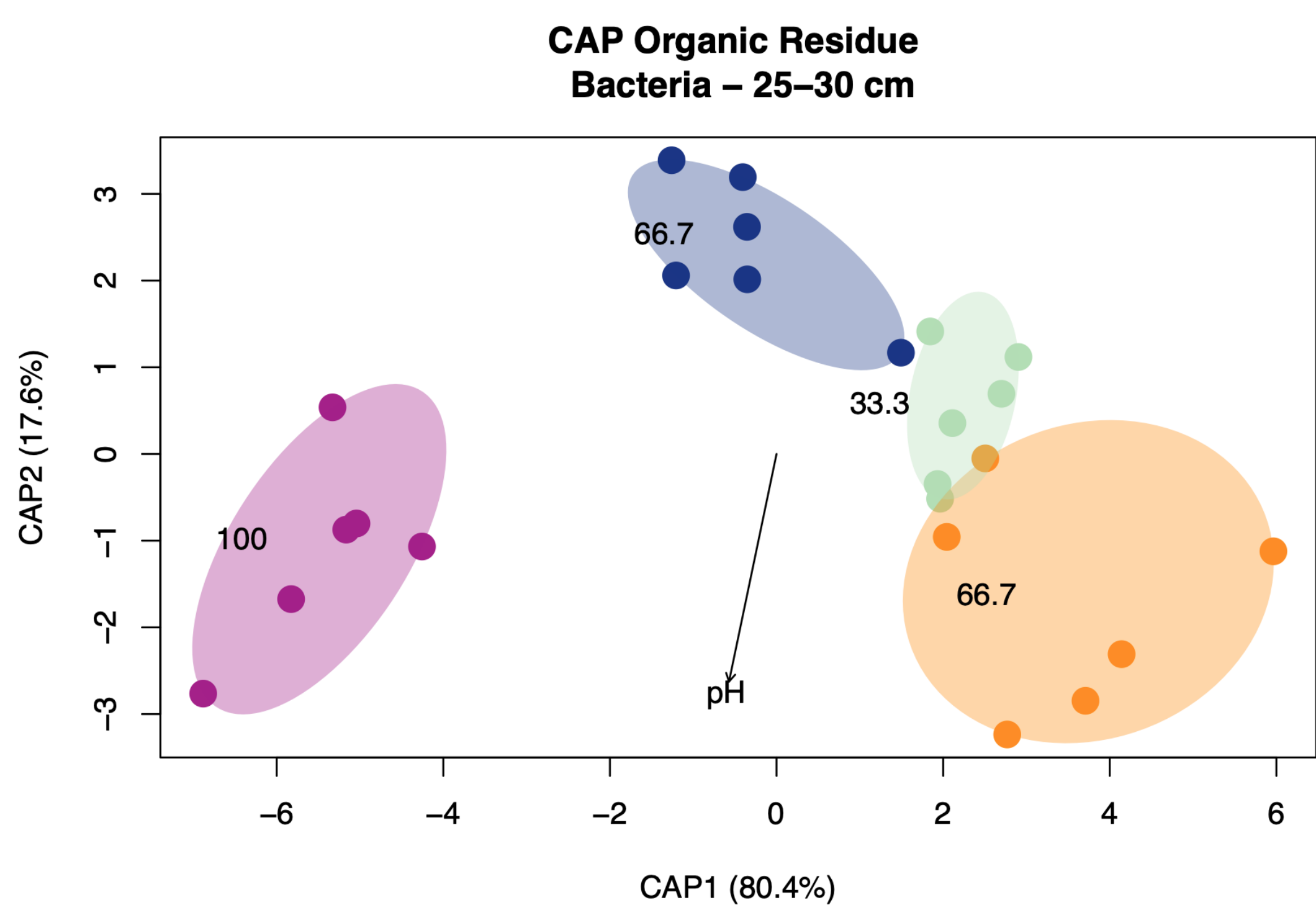
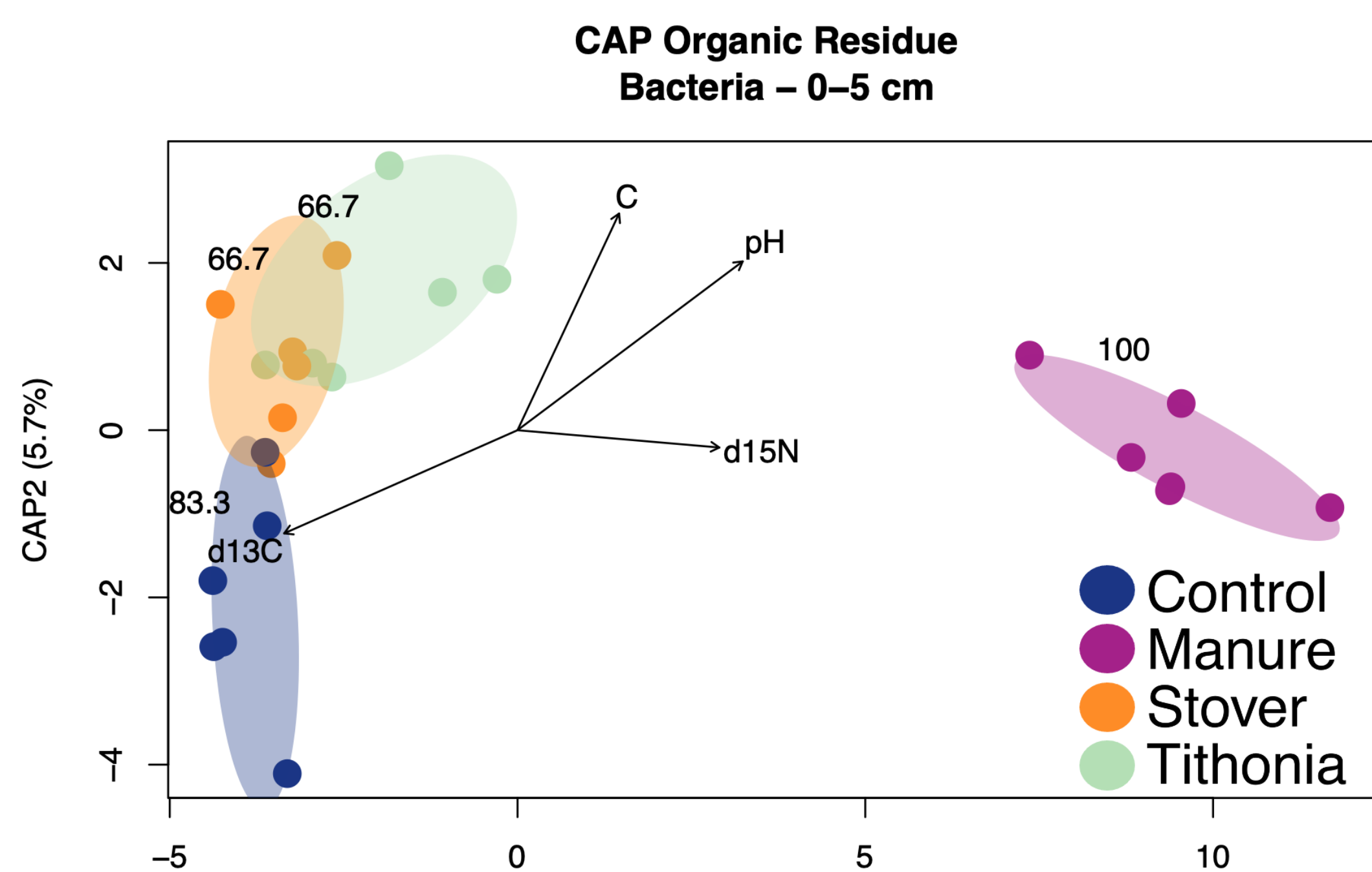
# Nutrient management shapes the subsoil microbiome in a long-term agricultural field trial in Kenya

This study aims to elucidate how the application of organic residues (OR) alters the microbiome in top- and subsoil in a long-term agricultural field experiment in Embu, Kenya. Samples were collected after 19 years, and the experimental treatments included the application of 3 organic fertilizers (farmyard manure, *tithonia diversifolia* residues, and maize stover) and a control treatment (no organic inputs). Soil samples were collected down to 70 cm depth in increments of 5 cm. Microbial community structures were assessed using a DNA metabarcoding approach targeting prokaryotic and fungal ribosomal markers.



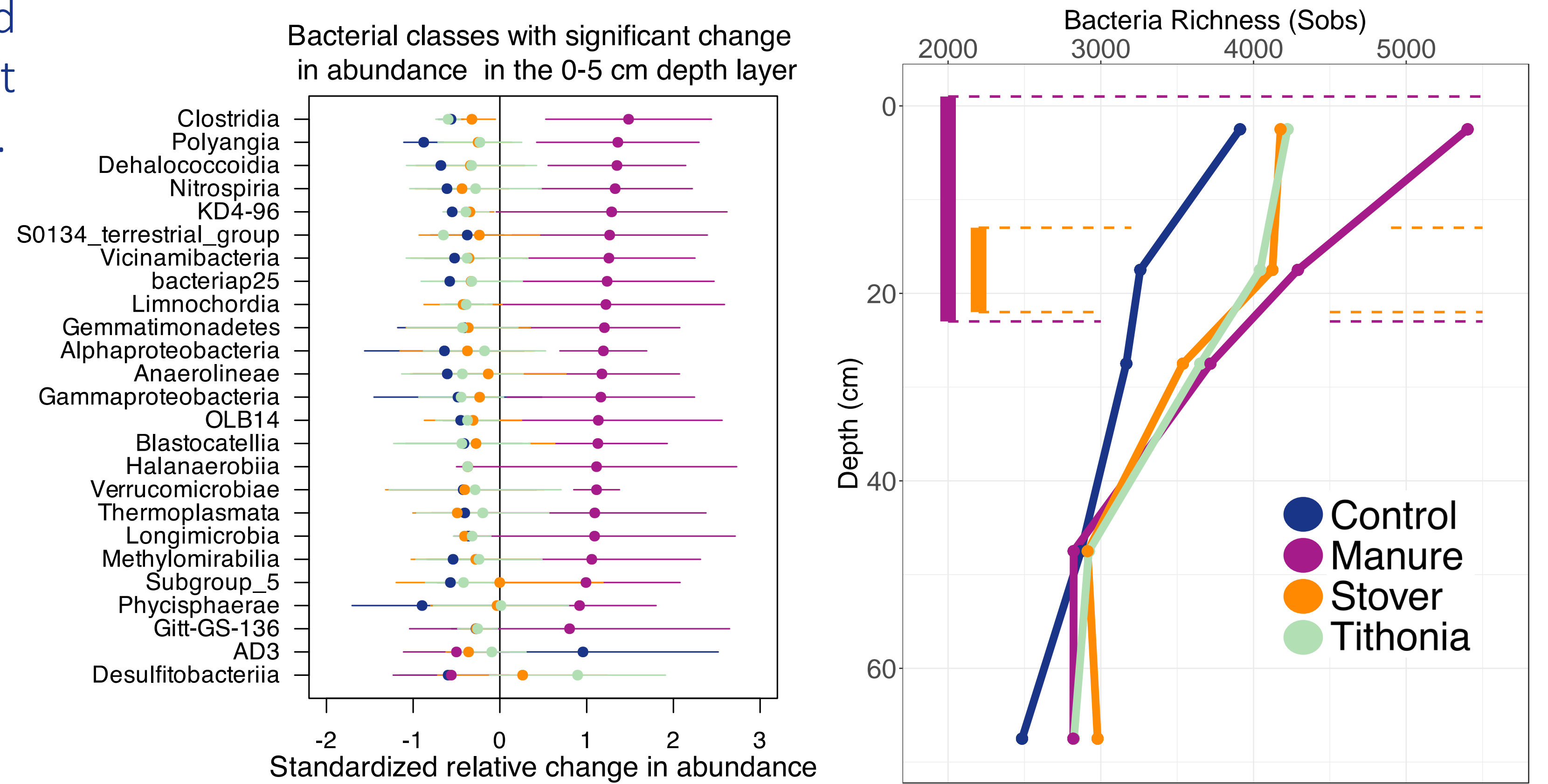
## Effect of treatment on bacterial community composition at different depth

While all OR affected community composition at all studied depth, the effect of manure was very specific and stronger than the other OR treatments in the topsoil, but all OR led to similar community composition in the subsoil.



## Applying manure increases alpha diversity

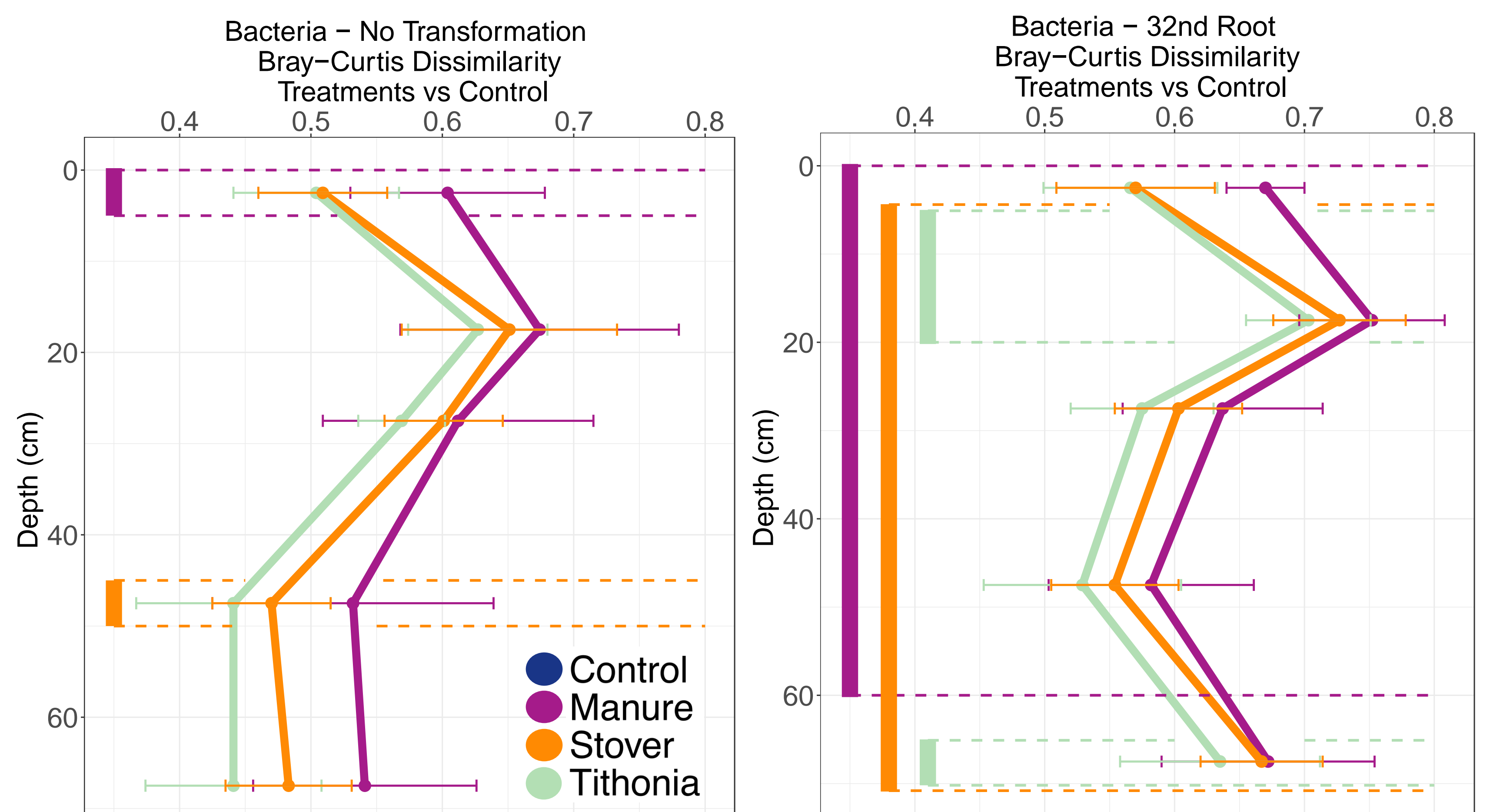
Manure adds a lot of bacteria to the soil, leading to an increase in alpha diversity, but this is only observed in the topsoil.



The vertical bars on the left side of the soil profiles plots highlight the depth layers with significant difference between given OR treatments and control.

## Organic residues affect community composition in the subsoil

A significant effect of OR on community composition at all measured depth was observed when the emphasis on the effect of the most abundant taxa was reduced prior to the analysis. This was done by transforming (32<sup>nd</sup> root) the ASV counts before calculating Bray-Curtis dissimilarity.



**Conclusion:** Organic residues applied at the soil surface affect microbial diversity down to soil layers below 30 cm, the soil depth commonly studied in agroecosystems. Applying manure had a strong effect in the topsoil, certainly because it contains a pool of bacteria that are added to the soil. However, manure led to a similar community composition as the two other OR treatments in the subsoil, which were different than the community composition of the control treatment.