EGUsphere, author comment AC1
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Reply on RC1

Sara Niaz et al.

Author comment on "Wetting and drying cycles, organic amendments, and gypsum play a key role in structure formation and stability of sodic Vertisols" by Sara Niaz et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-469-AC1, 2022

Reviewer 1

We thank the reviewer for the positive feedback.

We agree with the reviewer that wetting and drying cycles may cause anaerobic or anoxic conditions. However, in this experiment, the soils were kept wet at field capacity only for 24 hr and then left in open air for moisture loss (to initiate drying conditions) and the soils were packed to a height of 3-5 cm in jars with 12 cm width. Hence, we do not believe our experimental conditions have anoxia in the soil. Indeed, we have not measured a decrease in nitrate in our soil solution samples (which would happen if conditions were anoxic). We can include graphs if considered necessary to show this). The organic amendments except anionic polyacrylamide (PAM) were used in dried form to overcome differences in moisture content and particle sizes. While there may have been some losses of nutrients in the organic amendments due to drying, the nutrient content was measured on the dry material. Hence, we do not believe this would affect the interpretation of our results.

We also agree that different microbial communities may be added (or favoured) by adding organic amendments. However, the focus of our paper was not on different microbial populations but on aggregation (by whatever means the aggregates are formed, be it different microbes or iron oxides). While we measured the soluble chemical fractions (soil solution composition) in our samples (these data are reported in the supplementary section of our paper), we have not analysed if there are changes in the mineral phases during the trial since this was outside the scope of our experiment.

The focus of this experiment was to understand the effect of wetting and drying cycles on improving the structure of sodic soils under the application of different organic amendments. Therefore, to correlate the changes in aggregate stability and aggregation with microbial activity, daily microbial respiration was measured. In our earlier study (Niaz et al 2022) we measured Dissolved Organic Carbon (DOC) using the same soils and amendments under continuous wet conditions and found that DOC and soil microbial respiration were strongly positively correlated with each other, hence we are confident relating microbial respiration to DOC in this paper.