



EGUsphere, author comment AC4
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Reply on RC4

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., EGU sphere, <https://doi.org/10.5194/egusphere-2022-469-AC4>, 2022

Reviewer 4

We thank the reviewer for their time and constructive feedback which helped us to improve our paper.

- The introduction is revised as already suggested by other reviewers. In addition, the reviewer asked to add a brief information about how gypsum and organic amendments can affect aggregation and aggregate stability which has now been incorporated in the main text. An overall brief explanation about sodic soils and their poor structure is given in the introduction from lines 52-69. The effect of organic amendments or organic matter on aggregate stability was briefly described in introduction in lines 84-86. However, the role of gypsum was not explained which has now been added in the introduction as "Traditionally the management practices used to improve the structure of sodic soils involves the displacement of Na ions from the soil exchange complex with the help of divalent cations such as Ca or increasing the ionic strength of soil solution (Ghosh et al. 2010), both of which can be achieved by the application of gypsum to these soils. The effect of gypsum for increasing ionic strength is immediate, but short lived. In contrast, the effect of gypsum for providing the counter ion (Ca to replace Na) is permanent unless additional Na is added to system (e.g., using poor quality irrigation water)".
- The aims have been rewritten as "Thus, in the present study we used two sodic Vertisols, with the aim to: i) determine the role of gypsum and different organic amendments on aggregate formation and stability, ii) explore the combined effect of gypsum and organic amendments on soil physico-chemical and microbial properties, iii) investigate the effect of WD cycles on microbial respiration, iv) assess the effects of WD cycles on aggregate formation and stability, and v) determine how many WD cycles are needed to improve aggregate stability.
- The hypothesis has been rewritten as shown for reviewer 2.
- We have use two-way ANOVA to analyse the results which makes the description of results rather complex and repetitive. That's why the discussion was written as the relative role of each factor (WD cycles and organic amendments or gypsum). The interaction of these factors was clearly demonstrated by presenting PCA biplots after first, second and fourth WD cycle in Fig. 5 and section 3.4 (lines 341-356). The two-way ANOVA table can be included in the supplementary data.
- The dose of PAM in Table 3 has been corrected.
- The discussions have been revised as suggested by other reviewers (see reviewer 2).

