EGUsphere, referee comment RC2
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# Comment on egusphere-2022-469

Anonymous Referee #2

Referee 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-RC2, 2022

## General comment

This work has some scientific value, but the findings and conclusions obtained still need to be reconsolidated. Although this study focused on the physical properties of the soil, the authors' experimental design used different organic amendments with different chemical properties. It is clear that the reasons for the differences in the experimental results cannot be explained by the causes and mechanisms of the results through these soil physical property analyses conducted by the authors alone. Soil organic matter is essential for the formation of soil agglomerates, and the authors did not characterize the changes in soil chemical properties but mentioned soil organic matter and soil chemical carbon pools several times in the discussion. In addition, the characterization of microbial activity under different amendment applications by microbial respiration alone is relatively one-sided and is not sufficiently convincing for characterizing the decomposition effect of microorganisms on different amendments. The authors use unpublished results for citations several times in the discussion section, and this issue should be noted.

The authors selected four organic amendments with gypsum and used two soils, which was a multifactorial experiment that led the authors to derive 10 treatments in this study. However, the authors' conclusions do not explain well the reasons why different amendments produce different amendments in different soils. The authors also did not present the research hypothesis well. A true research hypothesis is proposed based on the purpose of the study, in conjunction with their own research design. At this point in the process, I don't think the manuscript is ready to be published. The authors should perform a high level of integration and analysis of the available data as well as the data in the supplementary material. If possible, please add the necessary soil chemical characterization data.

**Specific comments**

(line: comment)

- Organic matter in the title is easy to make the reader misunderstand and should be changed to organic amendments or organic material.
- Line 28: Please add the definition of PAM.
- Why did the author choose these four organic materials? What are their advantages compared with other materials? The author needs to explain this in the introduction.
- Line 111: Why did the author choose to collect only 10 cm of soil, which is not fully representative either from the perspective of soil improvement or agricultural cultivation?
- Lines 116–117: According to previous experience, the sieve with a 10-mm void does not completely remove stone and plant litter.
- The materials and methods do not mention the size of the containers in which the authors performed the incubation experiments.
- The author mentions the significance of the difference in the main text, but no significant difference can be directly observed in the chart. Authors are advised to add error bars.
- The discussion section needs to be dissected in more depth, especially 4.3.
- Lines 437–440: The author needs to list more references to prove the point.
- Lines 480–491: Conclusions should not replicate the findings but be more concise.