EGUsphere, author comment AC5
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Reply on RC5

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-AC5, 2022

Reviewer 5

We thank the reviewer for the positive feedback and hope our changes are satisfactory.

- The aims and research hypothesis have been revised as recommended by other reviewers.
- The sentences are reformulated to make it clear for readers to understand the changes driven by different amendments or WD cycles.
- The information regarding Vertisols has been incorporated in introduction as "Apart from the changes in soil structure due to the addition of different ameliorants, WD cycles can lead to more intensive changes in structure of soils dominated with smectitic clays (Vertisols). The WD cycles can directly affect aggregation of these soils through physical processes (Utomo and Dexter 1982; Denef et al. 2001). These soils are generally characterised as self-mulching soils as they exhibit shrink-swell properties imposed by the WD cycles (Pal et al. 2012). Vertisols cover a total of an estimated 340 million ha in the world (Australia, Asia, Africa, and America), out of which approximately 150 million ha is potential crop land. However, the physical properties and moisture regime of Vertisols represents serious management constraints (Pal et al. 2012). Sodic Vertisols are common in arid parts of the world. The effect of sodicity on the physical properties of Vertisols is still a subject of debate"
- We are not sure we correctly understand the question about preincubation; soils were not pre-incubated in the study, but they were collected in the field and would be pre-incubated there. We are not sure why pre-incubation would be useful – in the field, treatments are applied without pre-incubation. Our apologies if we misunderstood the question.
- The effect of rapid slaking was not checked as the soils were subjected to end over end shaking for the measurement of easily dispersible silt+clay.
- The conclusions have been revised as suggested by other reviewers.

Minor corrections

- Line 113 revised as suggested by reviewer
- Line119 corrected as suggested
- The formula used for gypsum requirement has now been incorporated in the main text from line 175 -176 "The gypsum requirement of both soil samples was calculated based on the formula given by Oster and Jayawardane (1998) as follows:

Gypsum requirement (GR)= 0.00086 x F x D x ∂_b x (CEC) x (ESP_i-ESP_f)

Where F is exchanged efficiency of Ca-Na and for this case considered equal to 1.

D_s is the depth of soil to be reclaimed (cm)

∂_b is soil bulk density (g/cm^3)

CEC is cation exchange capacity ($cmol^+/Kg$)

ESP_i is initial soil exchangeable sodium percentage

ESP_f is final or desired exchangeable sodium percentage.

Hence for soil 1 GR= 0.00086x1x10x1.29 (23) (14.9-6) = 2.27 Mg/ha

And for soil 2 GR= 0.00086x1x10x 1.29 (24) (15.9-6) = 2.52 Mg/ha

As an approximation, a single rate of application of gypsum, 2.5 Mg/ha was selected for both soils.