Review of AGE-2021-06-0080-ORA

General comments: This article seeks to address the impacts of long-term cover cropping on soil physical properties. The paper is well written and organized, and is a good fit for the journal. The authors utilize a rich dataset from four trials, but the analysis used and presentation of results are weak. Additionally, I believe there is a significant error in analysis that may have large impacts on the authors' results and their interpretation (see detailed comments below). Overall, the results and discussion section needs much improvement, and the authors should improve the overall discussion of the impact of their work. It is not clear to the reader a) what the major finding is and b) why that finding is important to the scientific community. I recommend that the paper be considered for publication only after major revisions are made. Specific comments are included below to aid the authors in improving their paper.

Specific comments:

Core idea 1: Change 14 cm to 10-18 cm to match methods section

Line 147: How many replications at each trial? Also, the authors do not discuss the impact of soil sample collection in the middle of the plots vs. nearer the plant.

Line 201: Note that the alpha parameter is not exactly the inverse of the air entry potential but is *related* to it. From Van Genuchten (1980) "The value of alpha was found to be… ***approximately*** the inverse of the pressure head at which the retention curve becomes the steepest." Other follow-up studies have shown that alpha values are related to air-entry potential but not exactly the same as that value.

Line 206: The residual water content is not the same as the water content at permanent wilting point. The residual water content is the water content at which no additional water is lost with increase matric potential and has nothing to do with plant water uptake. The water content at permanent wilting point is the water content associated with the matric potential at which plants cannot extract additional soil water and is entirely dependent upon the plant species. While these values may be similar for a given soil-plant system, to equate them to one another is incorrect.

Line 209: Replace "the data" with "measured values." The use of the term "the data" is overused and becomes confusing.

Line 215: Replace "extracted directly from the data" with "calculated from the measured data."

Lines 215-222: I am glad to see that more researchers are finally adopting the use of -10 kPa (-100 cm) as a standard value for the field capacity, and that the authors clearly state that the field capacity of a soil is dependent upon the depth to the water table. I image some reviewers may push back against the authors on this point, but the authors are both technically correct and do a good job of defending their use of -100 cm.

Results and Discussion: There is very little text in this section, and the text that is here is choppy and not very informative. The authors should thoroughly improve this section, including a more thorough presentation of results and improved discussion of their interpretation of those results.

Line 234: After "commercial field trials" add in parenthesis "East and West trials" for clarity.

Line 234: Was a statistical test done to determine significance here? There are several instances where this is not clear. I suggest the authors identify every instance of the word “significant” and insert p-values. If statistical tests were not used, do not use the word “significant.”

Line 236: Table 1 contains no relevant soil information.

Figure 2: Big issue here! Only three of the eight pie charts shown here contain soil textural fractions which sum to 100%. The one trial where both charts sum to 100% (Central-grain) shows no difference at all in texture between the CC and no-CC plots. Since most of the authors results hinge on differences in texture between plots, I suggest the authors double-check their textural analysis results and re-run any statistical analysis or modeling that could have been influenced by this error. The results of the study could be strongly affected.

Line 253: It is not clear to me why the authors made the decision to neglect the organic matter analyses. Hardly any information or explanation is given.

Line 273: Replace “could not be predicted based on” to “are likely unrelated to.”

Line 289-292: Two sentences does not make a paragraph. The authors need to expand this section to include much more discussion.

Figure 5: The boxes below the figure labeled “Micropore” and “Macropore” are not helpful, especially since the colors shown only apply for the “No Cover” columns. I suggest removing them, as they do not add any useful information to the figure.

Lone 305: Again, a single sentence does not a paragraph make.

Conclusions: This study presents an enormous amount of data and supplemental material, but looking only at the conclusions drawn I would have guessed that the authors did not gather any strong, relevant information from their work. Why is this work important?