SOIL Discuss., referee comment RC3
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Comment on soil-2021-25

Anonymous Referee #3

Referee comment on "Changes in soil physicochemical properties and bacterial communities at different soil depths after long-term straw mulching under a no-till system" by Zijun Zhou et al., SOIL Discuss., https://doi.org/10.5194/soil-2021-25-RC3, 2021

The manuscript “Changes in soil physicochemical properties and bacterial communities among different soil depths after long term straw mulching under a no-till system” presents an interesting experiment looking at an important aspect of agricultural sciences. The authors have collected a useful and impressive dataset to give a detailed analysis of the mulching treatments they have used here. Some aspects can be clarified and improved.

Introduction

The Introduction covers the important points but is perhaps too specific in parts when mentioning cited literature, so the reader may struggle to stay with the bigger picture and context of this study. Suggest removing some of the more specific sections and move these to the discussion section where they are relevant to the reported results from this work, rather than the study background in general. Otherwise, these parts could be removed from the manuscript.

Hypotheses are generally sound, although perhaps a little vague. It is not clear what is meant by saying that mulching will “increase most soil physicochemical parameters”. I assume this means measurable quantities such as total carbon, dissolved organic carbon, organic nitrogen and others will increase in the mulch treatment, but it could be phrased differently so that this is clearer. The same applies in the discussion section where similar phrasing is used, for example on L464, L574.

Methods:

Methods section is generally good although could be clearer in places and some important details are missing. In the first paragraph it is not currently obvious that the mulch addition/removal treatment was carried out annually for entire duration of the experiment, or if it was done once, or periodically, etc.

What size were the experimental plots and how were they spatially arranged? Were plots randomly arranged to minimise risk of field effects? The authors state that soil heterogeneity is assumed to be minimal, but this is not sufficient, and a randomised design for a trial is necessary. Acknowledgment/detail should be given regarding the number of technical replicates per plot that were taken, or if one sample per plot was used. Often there can be substantial variation within a field trial plot, and this justifies pooling multiple samples per plot to give a plot average, then multiple plots are compared to give treatment means (again, stating the size of plots will be important to allow the reader to gauge the rigour of the sampling methods).

More detail is needed L175-178 about fertiliser addition, the reader should not have to find another paper to find these important details for the study.

Section 2.3 – more detail/definitions are needed here for the soil physicochemical characteristics of the soils for readers who might not already be familiar with these terms. The authors should add brief descriptions of the methods for these parameters.

Statistical analysis – did data meet the assumptions for ANOVA? The authors say data were tested for homogeneity of variance but don't specify what these tests indicated. Data

often will not meet assumptions for tests of normality and homogeneity of variance where there are small replicate numbers. Where data do not meet the assumptions of the statistical tests, non-parametric tests should be used instead.

Results:

Through the section, statistics outputs need to show the effect size. The F-value (or equivalent for ANOVA) must be reported in addition to the p-value. This applies to the tables as well as in the text. Statements of data variability (for example standard deviation, standard error) must also be included. Without these, it is not clear what kind of data distribution lies behind the mean values reported.

The layout of table 1 is confusing. It is not clear why the CK vs SM data for pH are spread across one row with separate columns for CK and SM, while for TOC, there are two rows. This should be explained, and it would be better if the table were sorted by data presentation mode.

Discussion. The discussion section is good but could be more concise and avoid unnecessary repetition of the results. Conclusions section may be better used to provide wider context, give suggestions for future work. As written, it seems like too much of a repeat of a list of results of microbial community patterns.

Specific comments

L164: Strongly suggest avoiding the use of the word “cultivated" here. To some readers, cultivated is another way of saying “tillage”, and this is likely to cause confusion as the treatments are both no-till. “Managed” may be a better alternative.

Use of multiple acronyms for soil physicochemical properties is confusing when there are this many being studied. It may even be better to have them (TOC, TN, TP, IN and others) written out in full so that the reader can more easily follow what the authors are discussing.

L468: What is meant by “Apart from roots” here? This is not clear and should be amended.