

Response to comments and suggestions by Editor/Reviewers

Reviewer #2: 'Comment on soil-2021-17', Lukas Kohl, 30 Mar 2021

Lu and co-authors report on a study that investigates the impact of transition that conventional rice paddy/oilseed rape to vegetable cultivation has on soil properties. They report that increased over-fertilization and decreased organic matter inputs lead to nutrient accumulation and organic matter depletion in subtropical agricultural soils. This is an important and timely study that fits well into the SOIL journal. The authors do not provide sufficient details on the methods to provide a full judgement on the validity of their results, but my overall impression is that their conclusions are well supported by the data. The manuscript is written in technically correct English, but I think that some sections need to be substantially improved before publication (see below). I therefore think that the authors should be given the chance to substantially improve the manuscript before publication (major revision or rejection with invitation to resubmit).

[Response: Thank you very much for your kind comments and valuable suggestions for further improving the quality of current manuscript. We have revised the manuscript carefully, and all changes in the revised manuscript are made using Track Changes to make reviewing easy.](#)

Specifically, I think that the quality of the different section of the manuscript varies a lot. In my opinion, the results and discussion sections are well developed and can be published with little modification, whereas introduction and methods sections need substantial improvement. The introduction is very short and does not provide a full overview about what is known about crop-to-vegetable transition impacts on soils. The text also misses 'flow' from one paragraph to the next. I would recommend to broaden the introduction, and look at crop-to-vegetable-transitions studies conducted throughout various climate systems. In addition, the introduction could explain how the different parameters measured are affected by this transition, and what results are

therefore expected. In the methods section, a lot more detail needs to be provided with regards to data sources and analytical methods.

Response: Many thanks, we accept all your comments and suggestions, and have revised and added more information to the manuscript, particularly in the Introduction and M&M sections, e.g. “On average, the sown area of non-grain crops has increased by >12% since 1980 in China, with a corresponding decrease in grain crop cultivation (Chen et al., 2016)” (please see Line 35-36), “Numerous studies have reported on the serious soil degradation in greenhouse vegetable fields which have been converted from maize-wheat rotation in the North China Plain, as a result of high total fertilizer inputs and increased frequency of soil cultivation, resulting in a significant decrease of soil C/N ratio and pH, enrichment of P and K, and salinization (Ju et al., 2007; Yan et al., 2012). However...” (please see Line 46-49), “However, there is no information available about the effects of land use changes from cereals to vegetable production on the concentration of SOC and TN in southwest China.” (please see Line 58-59). In addition, in the M&M section, we have added a database of soil properties and provided further analytical parameters in the Supplementary Information. We now believe that the revised manuscript is much improved and is suitable for publication.

I have one major scientific concern that should be addressed by the authors. The manuscript states that soil properties of fields converted to vegetable farming were similar to those retained in conventional crop rotation. I think this authors need to provide more evidence for this point as it is an essential condition for the validity of their findings. In particular, I am wondering if the authors have any information whether the fields that were transitioned from conventional to vegetable farming were chosen randomly, or if farmers took soil properties into consideration when deciding if a given field was converted or not. If the latter were the case, the initial conditions of these field would be different from those retained in traditional crop rotation, which would limit the authors ability to link difference in soil properties to farming practices. This also applies to effects of time-since-conversion, since the farmer’s considerations could change over time.

Response: The comparisons of paddy-rape fields with similar field following conversion to vegetable production are based on matched soil types, i.e. soils that have developed from the same parent material and under the same conditions of regional climatic conditions and agricultural production practices. We do not have any information on whether the fields that farmers transitioned from conventional to vegetable farming were chosen randomly. According to the farmer survey, the most important factor influencing the choice of land-use conversion is for economic benefit, because the output-input ratio of vegetables is significantly greater than that of cereal crops and oil crops. Additionally, factors such as limitation of agricultural irrigation conditions for paddy production, topography, and farm size may have influenced farmer choice of which fields to target for transition. Whilst we understand this reviewer's comment, the biggest differences between vegetable production and paddy-rape rotation are the nutrient inputs (including organic and inorganic, please see Table 1) and frequency of cultivation. So, we believe these factors would far outweigh any small variations in e.g. soil texture.

Minor comments:

L37: per unit nutrient inputs: Specify which unit you refer to (area?)

Response: Yes, it should be "per unit area of nutrient inputs". We have revised text in the new version of the manuscript.

L64-70: the data presented here should be supported by references.

Response: Thanks. We have added an appropriate reference in Line 80.

L81: farmers' survey methodology: I assume this refers to an established survey or similar undertaking, but this is likely lost in the translation, and comes across quite confusingly. I recommend clarifying this.

Response: Thanks, we have added a sentence to clarify this. "A survey of management practices was conducted by face-to-face interviews with farmers in Jinping County in

Guizhou Province. Based on farmers' survey methodology (Jia et al., 2013), two of the most important vegetable production townships in Jinping County, Xinhua and Dunzhai, were selected in this area. In each township, four villages were randomly selected, and 15-20 farmers from each village who had managed paddy-rape rotation before switching to vegetable cropping system were randomly surveyed. Survey questions were related to crop varieties and the management of the two cropping systems, including sowing rate, fertilizer (chemical or organic) application rate, tillage frequency, crop-residue management, crop growth cycle, cropping duration, and yield." Please see Line 97-103.

Section 2.3: A lot more detail is needed here. Ideally, a reference should be provided for each method, along with enough details such that the reader can reproduce the measurements.

Response: Accepted and done. Please see Line 118-129.

Section 2.4: Here as well more detail needs to be provided. What were the nutrient concentration in each fertilizer, and how were they obtained (source?).

Response: Accepted and done. We have added more details information in the Section 2.4, and have shown as listed in Table S1 and Table S2.

Section 2.5: The use of a two-segment fitted line in Fig 2b is inappropriate because there are only 3 independent datapoints (underlying replicates are not independent of each other). Essentially, this just connects two points with a line in between. I also don't think this contributes to the findings of the paper, so I would recommend removing it. Also, provide an overview on the amount of each fertilizer used in each treatment group.

Response: Thanks for your thoughtful analysis and suggestion. Actually, according to nonlinear regression analysis, the linear-with-plateau model produced the best fit for the plots of SOC concentration of 0-20 cm soil layer in the vegetable fields (VF) and number of tillage operations since conversion to VF based on 48 groups datapoints, which were hidden in the manuscript instead of these 3 independent datapoints (the

mean values for the corresponding grouping parameters). In addition, we would prefer to keep the corresponding Fig. 2b, as considering tillage frequency is the key factor affecting the decomposition of SOC in agricultural soils (Pires et al., 2016; Six et al., 2000), and quantifying the correlation between the change of SOC and tillage frequency is very important.

L152: I assume the unit here should be Mg ha⁻¹ instead of Mg ha⁻¹ yr⁻¹

Response: Done.

L196: explain 'extension service'

Response: Accepted and corrected as requested. "The annual application rates of fertilizer N, P and K in the vegetable production (Table 1) were much higher than those recommended (N, 600-765, P, 79-144, K, 398- 498 kg ha⁻¹) based on crop requirements and soil properties, recommended by more than 30 agricultural research institutions nationwide (i.e. the extension service, Zhang et al., 2009)." Please see Line 230-233.

L207-8 weighted mean: weighted by what?

Response: We have clarified this sentence in Line 243-244.

286-288 check repeated statement.

Response: Done. We have deleted the repeated sentence.

Table 1 and 2: standard deviation or some other measure variance should state along with each value

Response: Accepted and done. We have added the standard deviation in the Table 1 and Table 2, respectively.

Fig 2. See comment on segmented fit above. Also, I guess with tillage frequency you mean number of tillage's since conversion? It would be simpler to just state number or years since conversion here. You could also add the PRF datapoint to the plot (time

since conversion = 0)

Response: Yes, you are right. We have corrected the statement of abscissa for Fig. 2B, and added the paddy-rape rotation datapoint to the plot.

Fig 3: Wider bars would make the figure easier to read.

Response: Done.

Fig 4: Did you actually calculate the cumulative P surplus for each site, or did you just multiply the average surplus with the number of years? If the latter, it would be better to just state years since conversion.

Response: Yes, we calculated the cumulative P surplus for each site.

Data availability: Raw data should be placed in a publicly available repository to meet the Copernicus/EGU data policy.

Response: Done.

Thank you very much for your consideration.

Kind regards,

(Ming Lu and Dunyi Liu)