

## **Response to comments and suggestions by Editor/Reviewers**

### **Reviewer #3: 'Comment on soil-2021-17', Anonymous Referee #3, 13 Apr 2021**

The present study intends to assess the effects over time of conversion from paddy rice-oilseed rape rotation (PRF) to vegetables (VF) cropping on soil organic carbon, total nitrogen, pH and nutrients considered as soil quality parameters. The subject fall within the general scope of the journal and it is a new and original contribution. In fact, this work provides useful data on soil organic matter within vegetables the cropping systems and confirms that is a sensitive indicator in environment degradation studies relative to land use and is worthy of publication in Soil. However, the manuscript requires major revision to improve the text and clarify some points before being acceptable for publication:

**Response:** Thanks for your kind comments and generally positive evaluation. We have revised the manuscript as per your suggestions. Please see below for details.

-Introduction section should include a work hypothesis.

**Response:** You are right, and we have added the corresponding hypothesis content to the Introduction section. “However, the impacts of land conversion from cereal cropping to vegetable production may be more adverse in tropical and subtropical regions compared to temperate regions due to higher temperatures and rainfall combined, low organic inputs and high frequency of tillage practices (NAPCC, 2016; Powlson et al., 2016; Sarker et al., 2018). Based on the background information, here we hypothesise that the conversion of cereals to vegetable production would results in significant degradation in agricultural soils in southwest China.” Please see Line 49-53.

- In my opinion, the first objective is encompassed in the second objective because this previous survey is necessary to select the different VF farms according to the time elapsed since the conversion to vegetables as well as to discuss the differences found between both types of crops. In any case, this survey generates a database with little

data and regional or local relevance.

Response: Yes, we agree with the reviewer, and have revised the objectives accordingly. Please see Line 68-73, “The objectives of this study were to assess the impacts of land use conversion from paddy-rape rotation to vegetable production on soil pH, SOC, TN, soil C/N ratio, available P (AP), CaCl<sub>2</sub>-soluble P (CaCl<sub>2</sub>-P), and available base cations (K, Ca, and Mg). In the present study, paddy rice-oilseed rape rotation fields were used as a reference, because all vegetable fields in this region were converted from paddy soil. This will allow the comparison between the conditions on areas that changed to open-field vegetable production with surrounding areas that have remained under paddy rice-oilseed rape rotations.”

- The experimental design is poorly explained, which combined with a poor presentation of statistical results, makes it very difficult to be certain what the researchers actually did. Were used plots randomly set up? For each time since conversion from PRF to VF; were all 12 plots located in the same farm? What is plot size? Where were 12 samples of PRF collected? Adjacent to what? Please add the distance between plots. Thus, information about plots distribution would help.

Response: We have revised Section 2.2 text carefully as per your suggestions: The field size of paddy-rape rotation and vegetable cropping were 0.03-0.13 and 0.01-0.08 ha, respectively.” (please see Line 104-105). “First, we randomly collected 36 soil samples from a total of 133 commercial vegetable fields that were converted from paddy-rape rotation 1-3 years (n=12), 5-10 years (n=12), and  $\geq 15$  years (n=12) ago. Second, twelve paddy-rape rotation fields and the adjacent (< 100 m) vegetable fields were also randomly sampled for comparison. The soil type of the selected sites and the Local/regional climatic conditions and agricultural production practices were similar” (please see Line 108-112).

- Line 92: Why were the soil samples collected in September?

Response: To ensure the consistency of soil sampling, because both the paddy rice cropping and the first of three consecutive (non-heading) Chinese cabbage seasons are

generally harvested in September according to the Fig. 1B.

- The effects of type of crop and soil depth on measured variables could be tested by a two-way analysis of variance. This statistical analysis could support the discussion about the differences along soil depth detected between PRF and VF crops.

Response: We agree. As per your suggestion, we have added the two-way ANOVA results on the differences of soil properties along soil depth detected between PRF and VF crops. Please see Table 2 and Figure 3, 5 and 6.

- Please, provide information about methodology followed for analysing soil parameters.

Response: Accepted and done. Please see Section 2.3.

- Line 88: “To investigate the effects of long-term fertilization....” This is not correct because the soil samples were collected also from VF crops that were converted from PRF 1-3 years and 5-10 years.

Response: Thanks, we have revised the sentence as “To investigate the effect of conventional fertilization on nutrient surplus, enrichment/depletion, and leaching them into the soil profile of vegetable field, a multistage sampling technique was used to select representative fields for sampling soils from each cropping system.” Please see Line 106-108.

- For the measurement of SOC following the dichromate digestion method soil samples are sieved to 2 mm and ground to a power-like consistency. However, the authors used soil samples passed through a 0.15 mm sieve for SOC and TN analyses, which prevents the comparison with other studies.

Response: Thanks for your meticulous mention. There many studies, which were mainly cited in the manuscript to make comparisons with the current study, have reported that soil samples could sieved to 0.15 to 0.25 mm (Yan et al., 2012; Wang et al., 2014; Gómez et al., 2020). Therefore, we think methodology and data generated in

this manuscript are comparable.

- Lines 154-156: Could you please add some more information in Mat & Meth. about tillage operations (e.g type of machinery, tillage depth, tillage timing)? a better description may help to support the suggestions made by the authors about the effects of tillage practices on soil organic carbon.

Response: Yes, thanks for your suggestions. We have carefully revised and added more details about tillage operations in M&M section. Please see Line 90-91.

- Line 117: the authors state that the accumulation of P surplus was calculated as the annual P surplus multiplied by planting duration. I guess that they meant that annual P surplus was multiplied by years since conversion to vegetable cultivation. This should be clarified.

Response: Yes, this has been clarified. Please see Line 144-146.

- Expressions like 1.92 or 0.80 mg P kg<sup>-1</sup> (see abstract and through text) must be arranged by keeping the homogeneity of significant figures that your equipment generates. What is the precision of your method? Probably significant figures are "out" of the precision of your method!

Response: Here, we used a UV-Visible spectrophotometer method to determine the soil P (including AP and CaCl<sub>2</sub>-P) concentrations, please see Line 124-127. This method is accurate enough to allow us to keep two decimal places.

- Some confusing sentences. What do the author's mean by “farmers’ survey methodology” or “local extension service”?

Response: We apologize for causing you any confusion, and have added some sentences to clarify this “farmers’ survey methodology” and “local extension service”. Please see Line 96-104 and Line 230-233.

- Lines 150-151: Where are the data of bulk density in the manuscript?

Response: We have added the bulk density data to the Table 2.

- Lines 212-221: This topic is not addressed in this study. Then, I suggest deleting it.

Response: Thanks for your suggestion. The discussion section in this paragraph is to further discuss the feasible strategies of improving the nutrient utilization efficiency and the soil quality of vegetable field in vegetable cropping systems. In our opinion, this is highly linked with the theme of this study.

- Lines 286-288: These two sentences are repetitive. One sentence should be deleted.

Response: Done. We have deleted the repeated sentence.

- The variance of data presented in Tables 1 and 2 should be expressed using standard deviation or standard error.

Response: Done.

- What data are shown in Table 1? Are average values of 36 surveys related to VF management?

Response: Table 1 is the investigated inputs and output for inventory analysis in paddy rice-oilseed rape rotation and vegetables production based on farmer surveys.

- Lines 165-166: The authors state that for every 100 kg ha<sup>-1</sup> of P surplus in the VF, AP concentration in the 0-20 cm soil layer increased by 1.92 mg kg<sup>-1</sup>. However, according to the equation obtained by the authors for the data of the Figure 4 ( $y = 19.234 X + 43.257$ ), for 100 kg ha<sup>-1</sup> of P surplus in the VF, AP concentration in the 0-20 cm would increase by 45 mg kg<sup>-1</sup>.

Response: We apologize for this mistake, and have revised the sentence: "For every 100 kg ha<sup>-1</sup> of P surplus in the VF, AP concentration in the 0-20 cm soil layer increased 1.92 mg kg<sup>-1</sup>". Please see Line 197-198.

- Lines 235-246: This topic is not addressed in this study. Then, I suggest deleting it.

Response: Accepted and corrected as requested.

- Lines 255-258: In relation to inorganic N losses, the ammonium fixing capacity of the soils used (Ultisol) should be mentioned.

Response: We have added the details of the ammonium fixing capacity of the soils used (Ultisol) into the Section 4.2: “The slightly lower pH in subsoil in the vegetable field compared to that in the paddy-rape rotation might have slowed nitrification such that part of the inorganic N remained in the ammonium form sufficiently long enough for some immobilization to occur (Figure 6; Marschner, 2012). However, Nieder et al. (2011) indicated that the ammonium fixing capacity of the Ultisol, the type of soil used in this study, is extremely low. This may increase the risk of ammonium losses in this region, a potential environmental issue that warrants more attention in the future.” Please see Line 285-290.

- Line 266 (P enrichment): It has been omitted that when the soil pH reaches values less than 5.3 as occurred by conversion to VF, the presence of Al and Fe in clay minerals of Ultisols can contribute to fixing process of P.

Response: We agree and have added this sentence to the Line 304-306.

- The English of the manuscript needs to be revised. They erroneously interchanged the term P surplus by surplus P throughout the text. For example, the authors write “the accumulation of surplus P” in the caption of Figure 4, whereas the title of x they write “accumulation of P surplus”.

Response: We apologize for this unintentional omission and have carefully revised the scientific terminology as P surplus. Thanks.

Thank you very much for your consideration.

Kind regards,

(Ming Lu and Dunyi Liu)