Response to Reviewer Comments

Responses to Reviewer 1:

Comments to the Author

In this study, a fixed-site field trial was carried out from 2008 to 2021 to examine the impacts of straw (wheat and maize) retention and mineral fertilization (N, P, and K fertilizers) on soil inorganic P fractions, organic P species and P-transformation microorganisms in bulk soils and water-extractable colloid fractions. The paper presented a very exhaustive scientific work, The manuscript represents an important original contribution to research on soil phosphorus dynamics. As evaluation techniques, the methodology used and the results of excellent scientific quality. I recommend being accepted for publication after the minor revision. Please see the specific comments.

Response: ***We thank the reviewers for the valuable comments which helped a lot for the manuscript improvement. We have addressed all of the suggestions and comments raised by the reviewers in the revised version. Please find below our detailed response to the comments.***

Comment # 1:

L141–Please report if some residue was left after digestion.

Response: ***Thanks for your suggestion. No residue was left after digestion. We have revised the text accordingly.***

Line 148-150: After microwave digestion, total P concentrations (TP) were determined by inductively coupled plasma optical emission spectroscopy (ICP-OES), with no residue left after digestion.

Comment # 2:

L183–the spectra was not shown in Fig. S4?

Response: ***OK, the spectra were shown in Fig. S6, not in Fig. S4. We have deleted it and the Fig. S6 was cited in the Line 271.***

Line 194-195: The spectra of bulk soil and WECs were processed using MestReNova 10.0.2 software.

Comment # 3:

Line 193–There is a misunderstanding in the description. Should be MEGAHIT was used to the assemble genome from reads (fastq formats)

Response: ***OK, we have revised the description as suggested.***

Line 204-205: MEGAHIT was used to assemble genome from the filtered reads (fastq formats) by de Bruijn graph with the minimum k-mer size of 21 (Li et al., 2015).

Comment # 4:

Line 208–the normality distribution (Shapiro–Wilks test), not tests?

Response: ***OK, we have corrected it to "Shapiro–Wilks test".***

Line 219: The normality distribution (Shapiro–Wilks test) were performed before ANOVA.

Comment # 5:

Fig.2– the caption needs to be corrected, What is "the A and B" in these figures?

Response: ***Thank you for pointing that out. We have revised the caption of Fig. 2 accordingly.***

Fig. 2 Relative abundance of genes responsible for microbial inorganic P solubilization, organic

P-mineralization, P-starvation regulation, and P-uptake and transport (A) and the individual gene relative abundance (B) in bulk soil

Comment # 6:

Fig.4–What is "the A and B" in these figures?

Response: ***Thank you for pointing that out. We have revised the caption of Fig. 4 accordingly.***

Fig. 4 Relative abundance of genes responsible for microbial inorganic P solubilization, organic P-mineralization, P-starvation regulation, and P-uptake and transport (A) and the individual gene relative abundance (B) in bulk soils and water-extractable colloids (WECs) among the W0M0F0, W0M0F1, and W1M1F0 treatments.

Comment # 7:

Table 3– modify the notes, there are three treatments in the tables.

Response: ***OK. We have modified the notes in Table 3 as suggested.***

The three treatments were: (1) the control treatment, without straw retention and mineral fertilizer (W0M0F0), (2) single application of mineral fertilizer (W0M0F1), and (3) both wheat and maize straw retention with no fertilizer (W1M1F0), respectively. DCP, dibasic calcium phosphate dihydrate (DCP, $CaHPO_4 \cdot 2H_2O$); Al-P, aluminum phosphate ($AlPO_4$); Fe-P, iron phosphate dihydrate ($FePO_4 \cdot 2H_2O$); and IHP, inositol hexakisphosphate, Values in each column followed by the different lowercase letters indicate significant differences ($P < 0.05$).

Comment # 8:

Table 5–there are three treatments in the tables.

Response: ***OK. We have modified the notes in Table 5 as suggested.***

The three treatments were: (1) the control treatment, without straw retention and mineral fertilizer (W0M0F0), (2) single application of mineral fertilizer (W0M0F1), and (3) both wheat and maize straw retention with no fertilizer (W1M1F0) respectively. Calculation by including diester degradation products (i.e. Glyc+nucl: α/β-glycerophosphate, and mononucleotides) with orthophosphate diesters (Diesters) rather than orthophosphate monoesters (Monoesters). Phosphorus compounds include orthophosphate (Orth), pyrophosphate (Pyro), myo inositol hexakisphosphate (Myo-IHP), scylloinositol hexakisphosphate (Scyllo-IHP), other monoesters not specifically identified (Other mono), α/β- glycer-ophosphate (Glyc), and mononucleotides (nucl). Values in each column followed by the different lowercase letters indicate significant differences ($P < 0.05$).

Comment # 9:

Table S2: glpA, glpB, glpC, glpK should be italic.

Response: ***OK, we have italicized "glpA, glpB, glpC, glpK" in Table S2.***

Comment # 10:

Fig.S6– Solution ^{31}P NMR spectra of NaOH–Na_2EDTA extracts of bulk soil (A) and water-extractable colloids (WECs, B), not bulk soil (a) and water-extractable colloids (WECs, b).

Response: ***Thank you for your suggestion. We have revised the caption of Fig. S6.***

Fig. S6 Solution ^{31}P NMR spectra of NaOH–Na_2EDTA extracts of bulk soil (A) and water-extractable colloids (WECs, B)