

Dear Editors and Reviewers:

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled "Soil carbon fractions and enzyme activities under different vegetation types on the Loess Plateau of China". Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval. Revised portion are marked in blue in the paper. The main corrections in the paper and the responds to the Editor's and reviewer's comments are as following:

**Anonymous Referee #1:**

**--The manuscript lacks the novelty. The authors did not address relevant scientific questions and the objects of this study.**

**Response:** Based on the four carbon fractions and three enzyme activities under various vegetation types considered in our experiments. In our opinion, this study, to some degree, enriches and broadens the vegetation ecology and restoration ecology of this area and provides important theoretical basis for ecosystem restoration and reconstruction in Loess Plateau of China.

We agree with reviewer's suggestions that the objectives and hypotheses were not clearly stated in the former paper. The initial idea was to bridge the connection between soil carbon fractions and enzyme activities for soils with different vegetation types. Therefore, we emphasized the purposes of the experiment, and the new section has been added just before the Hypotheses in the INTRODUCTION part: "The research questions proposed in our study were i) whether the content of soil labile organic C fractions and three enzymes were higher in the soils of forest than in the forest steppe and grassland? ii) does three labile organic C fractions exert various effects to enzyme activities in soils of difference vegetation types? iii) does the three vegetation types exhibited a similar vertical change along soil profile? — that is, the contents of the investigated soil parameters were decreasing from top to deeper soil layers."

Three hypotheses formulated based on our scientific questions were presented at the

end of the INTRODUCTION part, now.

--Page 3, line 45, “soils health” should be changed to “soil health”.

**Response:** We changed “soils health” to “soil health”

--Page 5, line 94, “various type vegetations” is corrected with “various vegetation types”.

**Response:** We changed “various type vegetations” to “various vegetation types”

--Page 6, lines 106-109, “For each vegetation type, four representative plant communities were chosen (Table 1), and, as replicates, three sampling areas were defined in the field for each representative plant community. In each representative plant community, three sampling plots were delineated.” What it means?

**Response:** -4 plant communities.

- In each community, 3 sampling areas.

- In each sampling area, three sampling plots.

- In each plot. A composite sample (made of 9 sub-samples) for 0-5 cm and a composite sample for 5-20 cm

--Page 6, line 121, “different type soil” is corrected with “different soil types”

**Response:** We changed “different type soil” to “different soil types”

--Page 10, lines 197-198, “The total N concentration of forest was significantly higher than the total N of both forest steppe and grassland” is corrected with “The total N concentration in forest was significantly higher than those in both forest steppe and grassland”

**Response:** We changed “The total N concentration of forest was significantly higher than the total N of both forest steppe and grassland” to “The total N concentration in forest was significantly higher than those in both forest steppe and grassland”

--Page 10, lines 199-200, “The total P concentration of grassland vegetation was significantly lower than for both forest and forest steppe.” This sentence is replaced with “The total P concentration was significantly lower in grassland than in both forest and forest steppe.”

**Response:** As suggested by the review, the former sentence “The total P concentration

of grassland vegetation was significantly lower than for both forest and forest steppe.” has been replaced by “The total P concentration was significantly lower in grassland than in both forest and forest steppe.”

--Page 10, line 223, “was” is corrected with “were”.

**Response:** We changed “was” to “were”

--**Discussion** With respect to the effect of vegetation on soil carbon fractions and enzyme activities, there were some literatures. Why have the authors yet studied the effect?

**Response:** Although soil carbon fractions and enzyme activities are well-known, few studies have examined correlations among soil organic carbon, soil microbial biomass carbon, soil easily oxidized organic carbon, soil dissolved organic carbon and soil enzyme activities of different vegetation types in Loess Plateau of China.

As for 4.2, the main focus has been shifted from the “4.2 Soil enzyme activities under different vegetation types” to “4.2 The vertical change of the soil enzyme activities”, and we discussed the enzyme variations along soil depth gradients, and tried to explained the reason in terms of litter inputs, soil microorganisms, above-ground vegetation effects.

To sum up, although soil carbon and enzyme activities are studied in previous works, there is a less focus on the relationship between soil enzyme activities and labile C fractions, namely soil microbial biomass carbon, soil easily oxidized organic carbon, soil dissolved organic carbon. Our results demonstrate differential effects of vegetation types on C fractions and enzyme activities further exhibiting dissimilar features among these observed effects on the Chinese Loess Plateau.

We tried our best to improve the manuscript and made some changes in the manuscript. These changes will not influence the content and framework of the paper.

We appreciate for Editors/Reviewers’ warm work earnestly, and hope that the correction will meet with approval.

Once again, thank you very much for your comments and suggestions.

Thank you and best regards.

Yours sincerely,

Shaoshan An (Prof. Dr.)

*College of Natural Resources and Environment, Northwest A&F University, 712100, P.R. China*

*State key laboratory of soil erosion and dryland farming on the Loess Plateau, Institute of Soil and*

*Water Conservation, Northwest A&F University, 712100, P.R. China*