

## ***Interactive comment on “Soil carbon fractions and enzyme activities under different vegetation types on the Loess Plateau of China” by Haixin Zhang et al.***

### **Anonymous Referee #2**

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Soil carbon fraction and soil enzyme can indicate the impact of different vegetation on soil quality. This manuscript deals with a very interesting topic, and the study results is important and relevant to the subject coverage of this journal. The content of soil organic carbon and its fractions as well as the soil enzyme activity were measured under three vegetation types. So the paper provide some data, and this is useful for understanding the effect of three vegetation types. But the innovation of methodology and ideas are insufficient. The level of English throughout your manuscript does not meet the desired standard. Please check the manuscript and refine the language carefully.

Major comment: The topical subject is not clear. I have well understood the purpose of

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this study was to compare the difference of soil organic carbon and soil enzyme activity among the three vegetation types. However, in the introduction section, it states “there is a lack of the information on the relationship between the soil carbon and enzyme activity”. This is blurred as a study topic.

Author just stated “Vegetation type was an important factor influencing the variation of soil enzyme activities and carbon fractions on the Loess Plateau”. Whereas which vegetation type is more beneficial to improve soil fraction or soil enzyme activity was ambiguous. So the conclusions are weak. The scientific design on different vegetation is reasonable. Whereas the second and third hypotheses in introduction are not specific. The sampling soil method in grassland is not reasonable. Author stated that the plot size for grassland is only  $1 \times 1$  m, and 9 sub-samples were collected. How variable the results could be? I think the plot size is too small. In order to cover statistical tests, the plot size should be increased for sampling soil. The results and discussion are not well structured and documented. In the discussion section, more sentences are descriptive, and do not clearly support the objective of the study.

Minor comment: The title is not very clear, the word “impact” or “variation” or the other should be added. The abstract is well organized, whereas the conclusion miss points. The results are not informative. Despite the magnitude of the experimental work, the statistical analysis are not enough, and conclusions are not sufficiently substantiated. The author can try a multivariate analysis.

Some study methods should be clarified: How to remove the living grass in grassland when sampling soil. The more basic information on the three study sites (Fuxian, An-sai, Lian Daowan), such as topography, soil types, the management history on the different vegetation types need be reported and discussion. 4 representative plant community were selected under one vegetation type. How much is the variation of soil organic carbon and soil enzyme activity under these representative plant community. Fresh soil are recommended in some assay. Author stated that the soil sample was kept at  $-20^{\circ}\text{C}$ . Whereas air-dried soil was adopted for measuring urease activity and

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Soil DOC. Why. CCA is the common abbreviation of canonical correspondence analysis, and it is not proper to be used in line 179 and the following parts. Authors should clarify the abbreviations they used.

Some section should be reduced: In introduction section, the impact of vegetation restoration on soil property should be reduced, and enhance more substance on the effect of different vegetation types. Some unmodified assay process for soil organic carbon or soil enzyme measurement could be removed or reduced. In 3.4 section, I suggest that the both section of 3.4.0 and 3.4.2 should be combined. Author selected urease, sucrose and alkaline phosphatase. If more enzyme activities were measured, the manuscript quality will be enhanced.

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Interactive comment on Solid Earth Discuss., doi:10.5194/se-2016-137, 2016.