

## ***Interactive comment on “Cultivated grasslands present a higher soil organic carbon sequestration efficiency under leguminous than under gramineous species” by Yu Liu et al.***

**Anonymous Referee #4**

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This paper contains the results of an application project that was conducted to determine the most suitable grassland for carbon storage in semi-arid condition. It can be said that this paper is appropriate when it is evaluated as project result report. However, due to the reasons listed below, this paper needs to be improved.

1. The experimental design was not clearly explained (factorial design, randomized block design, randomized plot design etc).
2. The other factors must be constant so that the differences that can occur in dependent variables can be explained only by independent variables. The primary independent variable in this study is the grazing area. The other factors such as soil properties (soil depth, grain size distribution, aggregation), seeding rate, amount of irrigation may

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affect the soil carbon content were ignored. Thus these factors must be constant so that changes in soil carbon parameters can only be attributed to the grazing area.

3. The variation in climatic parameters over the years should also be noted.
4. Differences in the grazing area that are considered to be factors were not clearly explained. What is the mean of uncultivated and natural grassland? I don't understand the differences between them.
5. Why the seeding rates were different? How these rates determined?
6. The differences between abandoned cropland and natural grassland in terms of plant covering rates were not given that they can impact the studied carbon parameters.
7. How the bulk density that has been used in the relative calculation formula was measured is not clarified. Where this value was measured in soil profile? In one point or along the profile? As it is well known that soil bulk density can vary along the profile depending on differences in soil properties.
8. Title is not suitable for this manuscript. Only two grasslands (leguminous and gramineous grasslands) have been mentioned in the title. However, there are 4 types of grazing compared.
9. The mistake made at the title of the article was also done in the abstract, only the findings of the comparison of the leguminous and gramineous grasslands were given in the summary section.
10. The map showing the study area and sampling points were missing.
11. The descriptive statistics and normality test results of studied properties should be given with a table.
12. The basic soil properties such as grain size distribution, aggregation, pH etc of the grazing areas were not given.

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13. When the results are given, it should be indicated in the text that whether the differences are statistically significant or not.

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