Response to comments

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Words labeled with red color are the editor's and reviewers' comments, and labeled with blue color is the response.

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Referee #2:

General comments

The manuscript "Dynamic and migration characteristics of soil free amino acids during the whole growth period of rice after application of milk vetch" is an interesting study about free amino acids in a paddy soil, taking into consideration the bacterial communities structure fluctuations during different plant growth stages. However, the manuscript should be improved before publication especially the material and methods section and the statistical analysis. In fact, many details are missing, which makes the work more complicated to understand and makes it difficult to permit the reproducibility. Below, some examples of points to modify.

Many thanks for such good comments and suggestion. It is very helpful to improve our manuscript. We have revised according to all the comments and suggestion for the manuscript.

Q1: L135: please describe the method.

A1: Thanks for the good suggestion. The soil sampling methods have been supplemented and added as follows: In this experiment, a multi-point sampling method was used to collect mixed samples of topsoil (0-20 cm) in each experimental plot with a soil drill at 0d (background soil, B), 10d (seedling stage, S), 38d (tillering stage, T), 80d (flowering stage, F) and 122d (maturity stage, M) respectively after CMV application, according to the decomposition rule of rapid decomposition in early stages and gradually slowing down in the late stage and rice growth stage. Soil samples at 0-20 cm, 20-40 cm and 40-60 cm in each plot were collected at the background and rice maturity stage. After soil samples at 0-20cm were collected, PVC pipes were put in place to isolate surface water, and soil drills were used to extract 20-40cm and 40-60cm soil layers in turn. Please see lines 137-143 of the revised manuscript.

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Q2: L140: how many replicates?

A2: Thanks for the good suggestion. In this study, three replicate experimental plots (3 m ×4 m in size) per treatment were designed in a random block arrangement. There were 3 replicates under the same treatment at 0-20 cm, 20-40 cm and 40-60 cm. Please see lines 123-124 and lines 142-143 of the revised manuscript.

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Q3:L141: “another part” can you please precise the sentence. Quantity?

A3: Thanks for the good suggestion. Each collected soil sample was divided into three parts for the measurement of the relevant indicators. The quantity of each part was guaranteed to be much larger than the sum of the soil required for each indicator, but did not calculate the weight of each part.

Q4: L147: please add °C.

A4: Thanks for your careful reading. °C has been added, please see line 155 of the revised manuscript.

Q5: Fig. 4: statistical analyses are missing.

A5: Thanks for your careful reading. The statistical analyses have been supplemented and added as follows:

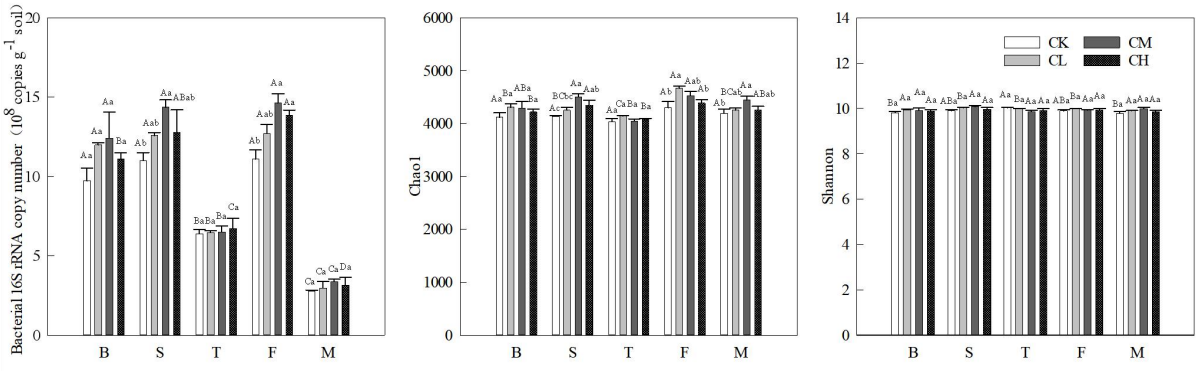

Figure 4. Dynamics of the copy number of soil bacteria and alpha diversity under different fertilization treatments during the different rice growth stages

Note: CK: chemical fertilizer, CL: low amount of CMV, CM: medium amount of CMV, CH: high amount of CMV, B: background soil, S: seedling stage, T: tillering stage, F: flowering stage, M: maturity stage. The uppercase letters represent significant differences in different growth periods, and lowercase letters represent significant differences between treatments ($p < 0.05$, Duncan test).

Q6: Fig. 6: statistical analyses are missing.

A6: Thanks for your careful reading. The statistical analyses have been supplemented and added as follows:

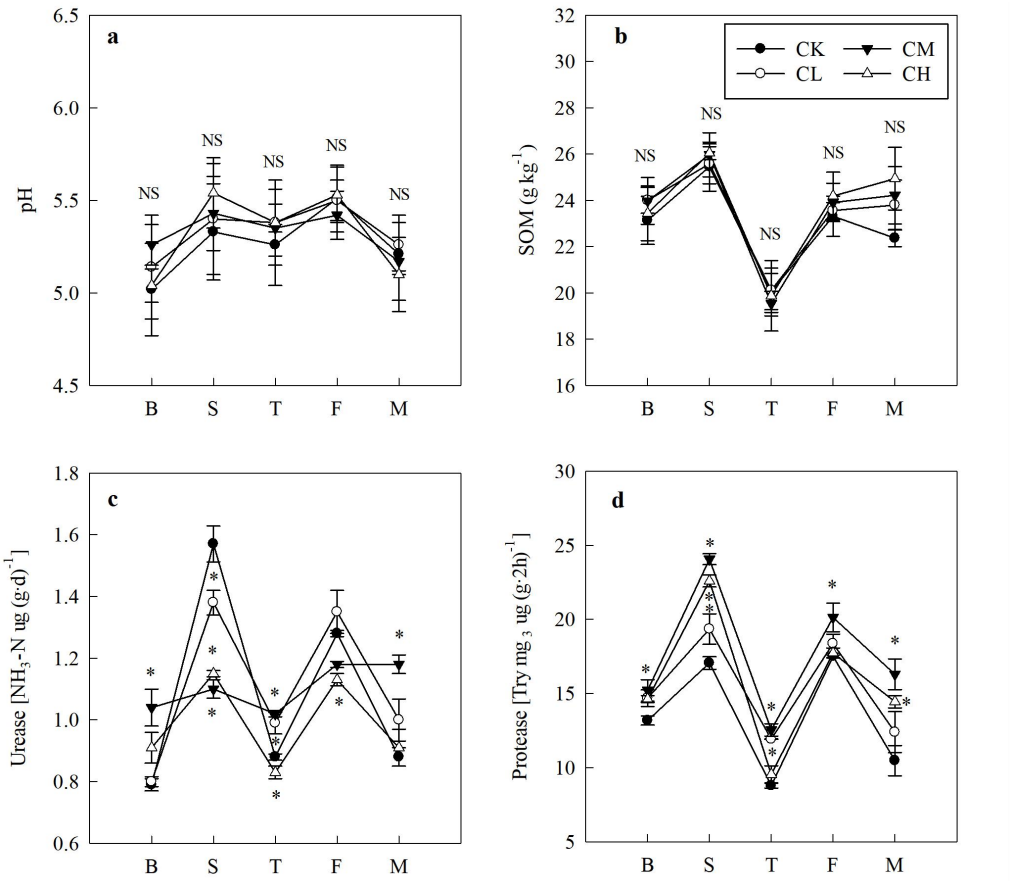

Figure 6. Soil pH, SOM, urease activities and protease activities under different fertilization treatments during different rice growth stages

Note: CK: chemical fertilizer, CL:low amount of CMV, CM:medium amount of CMV, CH: high amount of CMV, B: background soil, S: seedling stage, T: tillering stage, F: flowering stage, M: maturity stage. NS represent no significant difference among different treatments, and * represent significant differences between the Vetch and CK treatments ($p < 0.05$, Duncan test).

Q7: Fig.5: please add the p-values.

A7: Thanks for your careful reading. FIG. 5 was mainly used to explain the dominant bacterial community in the soil during the rice growth period and explaining the differences in each growth period of rice based on the distribution of the dispersion and aggregation of the samples. Therefore, significance was not added in the figure, and the P value cannot be obtained in the PCA plot.