

**Reviewer #2:**

Thank you for your comments and detailed revision. We have revised the manuscript according to your suggestion.

This manuscript deals with overland flow lab experiment to study the effects of two different herbaceous type with different root system architecture on the soil detachment process. They explore the influence of 7 plant densities (including the control-bare with no plants). The paper explores the associated interaction between the promoted changes in soil properties as bulk density, soil cohesion, soil aggregation and soil organic content due to the influence of the root architecture and density.

**Major concern:**

**1. As a general, there is a huge effort on the dataset collection and soil laboratorial analyses otherwise, the experimental set-up is poor in terms of statistical confidence. The experimental design is not appropriate for a scientific journal since it counts only with two replicates per treatment (line 178), so the reliability of results and thus conclusions are not convincing me.**

**Response:**

Although there are only two replicates for each planting density, we will repeat the measurement of soil properties and vegetation characteristics for three times in each replicate, so the actual number of replicates is 6. For soil detachment rate, we received runoff and sediment samples every 5 seconds in each soil tank, which meant that each soil tank had 15 repeated soil detachment rates.

For the indoor simulated rainfall test, due to the large steel tank we selected (2 m\*1 m\*0.5 m) and the large number of test treatments (rain intensity, slope and planting density, etc.), we selected two replicates due to the limitation of test conditions. In addition, for the indoor planting test, the planting density of two repetitions was the same, the growth environment was the same, and there was little difference between the repetitions. Therefore, we believed that two repetitions were sufficient. However, in future studies, we will consider the repeatability of the experiment.

**2.I would recommend to explore in the dataset if densities 5 and 10, 15 and 20, and 25 and 30 plant/m<sup>2</sup> could be aggregated, in other words, are differences between 5 vs 10, 15 vs 20, 25 vs 30 plant/m<sup>2</sup>? If statistically there are no differences, then you could try to build your treatments based on ranges of 5-10, 15-20, 25-30 plant/m<sup>2</sup>, in order to get more statistical confidence, and then properly discuss your results.**

**Response:** Thanks for your advices.

We explore the dataset of 5 and 10, 15 and 20, and 25 and 30 plant/m<sup>2</sup>, and found that soil properties were little difference between 5 and 10, 10 and 15, 20 and 25. However, soil detachment rate and hydraulic characteristics between 5 and 10, 10 and 15, 20 and 25 had great differences.

If we built our treatments based on ranged from 5 to 10, 15 to 20, 25 to 30 plant/m<sup>2</sup>, we only have three points in the diagram, which makes it difficult to fit the convincing equation. According to your suggestion, we will increase treatments in future research. In order to get more statistical confidence, we will try to build your treatments based on ranges.

**Moderate concern:**

**3.In mat/met section, any of the soil properties is referenced (line 239-249).**

**Response:** Done as suggested.

The references was given about measured soil properties.

**4.Please, define the meaning of “S” type sampling (line 239).**

**Response:** Done as suggested.

“S” type sampling was defined as sample in S shape in a small square.

**5.Number of plots should be 26, including the control-bare.**

**Response:**

You are right. The total number of plot should be twenty-six. But twenty-four steel tanks were used for planting.

**6. In 2.5. Statistical analyses should explain if data is normal or non-normal, so the use of parametric or non-parametric test. This item should be properly developed.**

**Response:** Thanks for your reminding.

Before statistical analyses, we first performed normal or non-normal test on the data.

**7. From my understanding, soil moisture also influences soil detachment, so repeated overland flow experiments would modify the initial soil moisture content, which must to be considered as a co-factor or factor on soil detachment processes, mainly on repeated overland flow experiences. Proper statistical tools should be properly applied for the repeated measurement statistical analyses.**

**Response:**

Soil moisture would be really affected the soil detachment. In our experiment, sprinkling water was carried out several times for each soil tank until saturation before scouring test. So, in our study, soil moisture would be not affected the soil detachment process.

**8. Many equations are used but any of them is referenced, please, equations should be referenced.**

**Response:** Done as suggested.

The references of equations were added in the manuscripts.

**9. English language-grammar must be deeply revised.**

**Response:**

We have read the full text and modified the English language-grammar.

**10. Units should be carefully revised. See line 25 for the soil detachment rate (i.e.: six planted densities ranged from 0.034 kg m<sup>2</sup> s<sup>-1</sup> to 0.112 kg m<sup>2</sup> s<sup>-1</sup> for BI and was ranged from 0.053 m<sup>2</sup> s<sup>-1</sup> to 0.132 m<sup>2</sup> s<sup>-1</sup> for AG,)**

**Response:** All units were checked and revised.

The sentences “six planted densities ranged from 0.034 kg m<sup>2</sup> s<sup>-1</sup> to 0.112 kg m<sup>2</sup> s<sup>-1</sup> for BI and was ranged from 0.053 m<sup>2</sup> s<sup>-1</sup> to 0.132 m<sup>2</sup> s<sup>-1</sup> for AG” was revised as “six planted densities ranged from 0.034 kg m<sup>2</sup> s<sup>-1</sup> to 0.112 kg m<sup>2</sup> s<sup>-1</sup> for BI and was ranged from 0.053 kg m<sup>2</sup> s<sup>-1</sup> to 0.132 kg m<sup>2</sup> s<sup>-1</sup> for AG”