

# **Interactive comment on “Precipitation alters plastic film mulching impacts on soil respiration in an arid area of Northwest China” by Guanghui Ming et al.**

## **Guanghui Ming**

Authors' responses (blue color) start with “response”.

-This manuscript reports findings from a field experiment on the effect of plastic mulching on CO<sub>2</sub> emissions from soil furrows and ridges, in relationship to temperature and soil moisture. This topic is of interest to readers of HESS. However, the presentation of the results and discussion in this manuscript is unclear, making it difficult to interpret and evaluate the findings. Furthermore, the final conclusions are not supported by a critical evaluation of the uncertainty and statistical power of the results.

Response: Thanks a lot for the reviewer's constructive comments that helped us to improve the quality of our manuscript. We have restructured/rewritten our results and discussion as per the reviewer's suggestions and the uncertainty was evaluated with statistical analysis to support our results. Below we address all the comments on a point-by-point basis.

Specific comments:

- The introduction is very long and contains a lot of unnecessary information

Response: The introduction has been shortened by about 1 page with moving “the effect of different climates on soil respiration” paragraph to the discussion, and removing other non-relevant sentences. Thanks.

- Consistent references to figures are missing from the text

Response: The missing references have been added in the text according to the reviewer's suggestions. Thanks.

- Throughout the paper, reference is made to the seasonal respiration. However, it is not clearly defined what is meant with this. I assume it refers to the growing season. However, how many days was this exactly? Was the length of the season the same number of days each year? How was this decided?

Response: The seasonal respiration refers soil respiration in the cotton growing season. The planting date of the cotton depends on the local temperature and thus differs in the three experimental years. Generally, the growing season is from germination in late April to harvest in late September, about 150 days. We have addressed it in the revised manuscript.

- Fig 3: Why was CO<sub>2</sub> respiration measured for a different number of days in the different years? This should be addressed in the methods and results section.

Response: Study periods were concentrated on the growing season as soil respiration in non-growing seasons is extremely low. The experiments in the year 2014 and 2015 began in the bud stage when cotton began to grow faster. Therefore, the lengths of measured periods are different for the three years, with 95, 60, 100 days, respectively. We have addressed it in the methods and results section. Thanks.

- Fig 7: Where do the data of soil respiration with days after irrigation come from? The method section states that respiration was measured every 2 weeks.

Response: We are sorry for the misleading. Actually, soil respiration experiments were carried out randomly between two irrigation events, i.e., the measurement day can be any day after an irrigation event. We revised the corresponding sentences accordingly. Thanks.

- Page 22, line 500-518. Looking at the figure, the data points form a cloud with one outlier. It is not appropriate to assume a linear correlation here.

Response: Inspired by the comment, we have reviewed more literatures and found one more experimental result in subtropical monsoon climate with precipitation larger than 1000 mm, which is shown in the figure below. We also carried out the statistical test to support the linear correlation conclusion. Thanks.

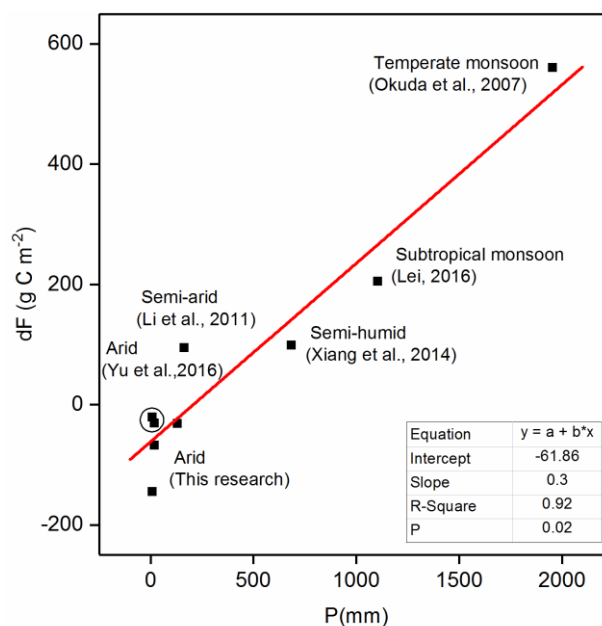


Figure. The relationship of the difference of soil respiration between mulched and non-mulched fields with precipitation in different climates. (dF means the soil respiration in non-mulched field minus that in mulched field; In the five points of arid areas, two points from (Yu *et al.*, 2016) are in the circle while the other three points from our research are outside of the circle.)

- The sections on the effect of irrigation and precipitation on soil respiration can be combined as both seem to produce similar effects

Response: Irrigation and precipitation both affected soil respiration by affecting soil moisture. But drip irrigation and precipitation had different effects on soil moisture in mulched and non-mulched fields. So we separately analyzed and discussed the effect of irrigation and precipitation on soil respiration in order to get our main findings. We would prefer to keep the two sections as they are. Thanks.

- Though the English grammar is good, the argumentation and writing throughout the manuscript is hard to follow and needs careful editing.

Response: Several paragraphs in the manuscript have been carefully restructured and some of the argumentation has been formatted to make it more logical and readable. Thanks.

- A discussion of the statistical significance and uncertainty in the findings reported here is missing. Such an evaluation would be essential here to support their broader claim that plastic mulch increased CO<sub>2</sub> emissions in arid environments.

Response: Thanks for your valuable suggestion. The statistical significance of soil respiration in mulched and non-mulched field has been assessed with the hypothesis *t*-test. The uncertainty has been assessed with the standard derivation of duplicates. The results show that our conclusion can be supported by the evaluation that plastic mulch increased CO<sub>2</sub> emissions in arid environments.

In addition, all figures, tables and their headings need a lot of improvement:

- Fig. 1 is very hard to read in color and unreadable when printed in black and white. A schematic figure may be clearer and more helpful

Response: We have re-drawn a new schematic figure to illustrate cotton planting and drip pipe arrangement, as well as the experiment design.

- Throughout the manuscript, figures and table headings are missing definitions of abbreviations and labels of the different treatments

Response: Revised. Thanks.

- Figure 3 is very unclear. The labeling on the y-axis of the top and bottom figure is missing. The scales of the x-axis and y-axis of the 3 graphs are different, making it impossible to compare the data. Furthermore, the layout is inconsistent between graphs.

Response: The labeling, scales and layout of the three graphs has been rearranged to make them more readable. Thanks.

- Figure 4: the layout of this figure is confusing, and hard to read when printed in black and white. In addition, the figure heading states this is the seasonal accumulative soil respiration, whereas the figure shows years. Define this more clearly. Which season is considered here?

Response: The data shown in the figure are the seasonal accumulative soil respiration.

The labels of x-axis show different years indicating the growing seasons of these years. The growing season in our paper can be generally considered from late April to late September, as described in the above response to Specific Comment #3. The authors are sorry for the confusion, and the manuscript has been revised accordingly. Thanks.

- Fig 7: The temperature plot is not needed here, removing it may make the other 2 figures more readable.

Response: Done. Thanks.

- Figure 9: what is G? Why are dates reported here, when other figures use days?

Response: We are sorry for the carelessness. Indeed, "G" is a drawing mistake. It has been deleted in the revised manuscript. The dates have been replaced by DOY (days of the year) according to the suggestion. Thanks.

- If I understood the text correctly (page 22, line 500-518), this figure was made using literature values. This should be explicitly stated in the figure heading, and references should be included. Also, define dF in figure heading.

Response: Yes, figure 10 is the analysis of the literature review. As per the suggestion of the reviewer's, the figure heading has been explicitly stated with detailed dF definition. References have also been added for each study. Thanks.