Dear Editor Prof. Jianming Xu,

Thank you very much for your positive feedbacks and for giving us an opportunity to resubmit the revised manuscript. Based on the constructive comments from two reviewers, we strongly improved this manuscript. We hope the revised manuscript will meet the standards of your journal Biogeosciences. Please see our detailed point-by-point responses below.

Best regards,

Xiaoqi Zhou on behalf of all authors

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Editor comments to the Author:

This manuscript has been examined by two expert reviewers. The authors have also responded to the review comments through Interactive discussion. In general, the review result and feedback are relatively good. Taking into account the limited data and meaningful phenomenon of this article, I completely agree with the suggestions of the two reviewers suggesting that the article should be changed into a technical note, a kind of short communication in this journal. Indeed, the authors do not have strong data to prove the prior hypothesis. The most critical issue is whether drought and ethylene biosynthesis inhibitor actually influence the production of ethylene. It is suggested that the authors are able to make more specific discussion to clarify whether stressed plants can release enough ethylene into field soil, which inhibits the microbial oxidation of methane.

R: Many thanks for your positive comments.

Anonymous Referee #1

The authors conducted a field experiment to assess how the use of ethylene biosynthesis

inhibitor (AVG) would alleviate the inhibitor y effects of ethylene from plants due to drought stress to methane oxidation of soil microbes. Their results showed that adding AVG could increase soil methane oxidation rates compared to control, and thus they concluded that AVG application can increase soil methane oxidation process under moisture stressed conditions. I found this manuscript was straightforward and well written. The topic falls within the scope of the journal. But I think this paper is more suitable for a short communication, as the paper is too short and data presented here was very limited. I suggest the authors can modify it to a short communication.

R: Many thanks for your positive comments. We have asked the journal manager to change the type of this manuscript into 'Technical Note', a kind of short communication for this journal.

Some minor points are here.

1. L67-70 Rephrase it. Too long to understand.

R: It has been revised. Lines 72-74

2. L111-116 How many gas sampling was conducted to measure CH_4 oxidation rates in one jar? How about the coefficient for linear regression? It's better to show gas concentration over time for different treatments in this study.

R: We conducted two gas sampling at the beginning and the end of the incubation. Then soil methane oxidation rates in each jar were calculated from differences in the headspace CH_4 concentration over the incubation time. We cannot provide the changes in CH_4 concentration and we cannot calculate the linear regression of soil CH_4 oxidation rates over time, but we acknowledge that these data will make these results more interesting. Lines 126-128

3. L135 "CH_4 methane oxidation"

R: Thanks. It has been changed into 'CH_4 oxidation'. Line 152

4. L161-164 Can excessive irrigation directly reduce aerobic methane oxidation as the

authors proposed in L148-152?

R: Yes, it might be possible. However, it would be expected that the combination of irrigation and AVG would produce CH_4 oxidation rates either the same, or potentially greater than, those observed for AVG alone. In this study, we did not find this case, so the explanation for the significant interaction remains unknown. A further study are needed to investigate the effects of plant, soil and microbial interactions under drought stress. Lines 189-196

Anonymous Referee #1

Received and published: 22 May 2018

Minor points L67 “may be”

R: Thanks. This has been revised. Line 67

L128 “was determined”

R: Thanks. This has been revised. Line 128

L163-164 How is the biochar used in this study different from others? Please provide detailed information.

R: This has been revised.

Another reason for this might be related to the properties of the biochar (C:N ratio of 51.84, 9.2 t ha^{-1}) used in this study when compared with agricultural soils in Finland (C:N ratio of 101.07, 9 t ha^{-1}) (e.g. Karhu et al., 2011) and in East Asia (C:N ratio of 79.65, 2 t ha^{-1}) (e.g. Kim et al., 2017). The lower C:N ratio of the biochar used in this study can incorporate more N fertilizer into the soils, which could reduce soil CH_4 uptake as N fertilizer can inhibit methanotrophic activities (see Kolb, 2009). Overall, the reason why BC addition did not result in increased soil moisture in this case is unclear. Further studies is needed to investigate the effects of biochar application on the factors influencing soil CH_4 oxidation.

Lines 161-170

L183 “and directly”

R: Thanks. This has been revised. Line 189

Anonymous Referee #2

Received and published: 23 May 2018

This is a problem-based research and the experiment is well designed. The authors found that an ethylene biosynthesis inhibitor (AVG) increased the methane oxidation rates. The manuscript is short but well written. It should be changed to a short communication. I just have few minor comments and questions.

R: Thanks for your positive comments. The type of the manuscript has been changed into ‘technical note’, a kind of short communication for this journal.

1.Why did not determine the methane oxidation rates in situ? The incubation only shows the potential rates. 2.The authors sampled the soils in late June. It will be better If they can sample for several times from April to June.

R: Yes, you are right. It is very unfortunate that I got some personal healthy issue while doing this experiment, so we only collected one sampling time of soil samples before crop harvest and did incubation to measure soil methanotrophic activities. However, our results provide good evidence for our previous hypothesis that drought-induced *in planta* ethylene production reduces soil CH_4 oxidation rates (Zhou et al., 2013). In summary, we do acknowledge that *in situ* CH_4 efflux data and/or more sampling times would have been better, but unforeseen circumstances did not allow it.

3. L162: What is “produce CH_4 oxidation rates”?

R: It has been revised. Line 190