

## Review BGD-2023-102

The authors present a nicely written study on the effect of reduced fertilisation rates in combination with mechanical weeding on GHG fluxes in an industrial oil palm plantation in Indonesia. I support the publication subject to revision detailed below IF all points can be addressed. Hopefully it is just a case of clarification and not serious flaws in the study design.

My main points are that you need to clarify early on that your presented CO<sub>2</sub> fluxes are from chambers and likely not soil respiration as the enclosure time was too long for that. Please clarify whether there was vegetation present in the chambers or soil only. This needs to be caveated throughout, especially when you compare your results to studies that measured 'proper' soil respiration.

Please clarify your measurement regime around the fertilisation period. It is not clear whether measurements were more frequent after fertilisation (which they should have). Otherwise your interpretation of fluxes due to fertilisation might be flawed and cannot be accepted for publication in its current form. To characterise peak N<sub>2</sub>O emissions after fertilisation, daily measurements are needed initially and frequent measurements at least over two weeks until fluxes are back to background levels. Otherwise no sounds cumulative emissions from a fertilisation event can be determined.

### Specific comments:

L22 add 'for' after accounted

L149/150 & L173 change to the 'University of Goettingen'

L138 Did your chambers include vegetation or just soil? This particularly important to interpret the soil CO<sub>2</sub> fluxes. You can't call them 'soil respiration' later on (e.g. l 299) if some of the chambers contained vegetation or litter such as palm fronds. A better term to use might be soil efflux or ecosystem respiration?

L140 How frequently did you measure after fertilisation? Did you measure more frequently after the fertilisation? It is not clear at the moment as figure S2 only shows monthly measurements. There is a risk you are over-interpreting your results if you only measured once after application.

Section 2.4 (L176 to L197) Please write out the equations with an equation editor, number them and then refer to them in the text. It would make it a lot clearer to see which equations have been used and what the parameters within one equation are.

Figure S2 It is not clear whether you measured more frequently after fertiliser application. Only using monthly measurements you might not have captured the peak emissions after fertilisation adequately and you cannot base statements on one measurement after fertilisation.

L 265-275 Be careful what you compare your CO<sub>2</sub> fluxes with. Some of your referenced studies reported pure soil respiration measured from soil only with infrared gas analyser and proper soil respiration protocols. You are presenting chamber measurements using a different technique and potentially vegetation present in your chambers. So please add a caveat to this part of your discussion.

L331 If you have only measured once after fertilisation, your entire argument might be flawed.

L 337 change to 'reduced'

L429 You only measured GHG for one year so concluding here over 4 years is a bit misleading, if you are including results from other studies in this statement please mention it