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Interactive comment on "Responses of nitrous oxide emissions to nitrogen and phosphorus additions in two tropical plantations with N-fixing vs. non-N-fixing tree species" *by* W. Zhang et al.

Anonymous Referee #3

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This study manipulates nitrogen and phosphorus addition levels to examine the responses of N2O emission in tropical plantation with N fixing and non-N fixing tree species. The research method and data collected are solid, and the phenomenon basically makes sense. I think it's an interesting study for us to investigate the competition between plant and microbial in using and transforming nitrogen. But I still have some concerns regarding the discussion of underlying mechanisms.

1) In P1421L20-25, the authors stated that P addition increased soil available N content in AA plantation in the first year. What's the reason if no significant change in mineralization and nitrification was found in P addition treatment? It conflicts with the authors' argument that NP-addition decrease N2O emission in AA because P addition

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relieved P shortage and stimulated N uptake by plants (P1428L10-15). I would like to see authors' opinion on this issue. I am thinking the different N-min and nitrification rates in two years may help to explain this phenomenon.

2) In the control plot, soil C/N ration in AA plantation is larger than EU (Table 1). How could you confirm EU is limited by N availability? I am wondering if EU is more limited by P availability than AA, and none of these sites is limited by N. I found litter mass increase in MP addition but declined in HP, while litter mass decreased in both MN and HN additions in EU (table 2). Is it because restricted plant growth or stimulated mortality/turnover in N addition? P addition reduced N2O emission from EU plantation, which is likely because alleviation of P limitation stimulates plant growth and N uptake. But I cannot find evidence to support the argument made in this paper ("Alleviation of P limitation resulting from P-addition might restrict the stress of N limitation, and then reduced soil N2O emission from the EU plantation."). Is there any productivity measurement? Or maybe the authors have other data to convince me. BTW, this sentence is pretty awkward, and needs to be rephrased.

3) Figure 2 shows that P addition in EU plantation significantly decreased N2O emission, which is even smaller than control. However, P addition alone has no effect on AA's N2O release. The authors argue that it is likely because AA is an N fixing species and has higher initial soil N status. P addition may alleviate P shortage. But the pattern shown in Figure 2 looks not in line with this guess. The non-N fixing species has more response to P addition. How do you explain it?

4) In Figure2, N addition alone in AA has increased N2O emission, and this increase declined in NP addition. However, P addition alone did not change N2O emission in 2-year measurement. The authors also pointed it out (P1427L20-25), but didn't give clear explanation. Is it because P shortage of AA is more significant at high N input levels, or P addition alone does not stimulate plant N uptake at current N deposition rate? Do you have other data to test this?

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5) Table 4: I'd like to see the errors of emission factor among replicates in each treatment, and the significance levels of difference.

6) Abstract: please indicate which species is N fixing and which is non-N-fixing in the beginning.

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