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Interactive comment on "Strong stoichiometric resilience after litter manipulation experiments; a case study in a Chinese grassland" *by* C. W. Xiao et al.

Anonymous Referee #2

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The manuscript "strong stoichiometric resilience after litter manipulation experiments; a case study in a Chinese grassland" explores effect of increasing litter input on soil nutrients, plant growth and ecological Carbon (C) : nitrogen (N) : phosphorus (P). The manuscript is well written and interesting. A better insight on the relationship between litter inputs and soil processes are indeed important for future climate change projections.

However, before the manuscript can be published, I have some points which should be clarified and improved.

General comments Introduction. I agree it is much likely that with CC (climate

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change)we may increase biomass production in some regions. In this case, regions will receive have more rain, temperature and CO2 and thus presumably higher litter inputs. However, in other cases this might be the opposite. . ..!!! What I missed here, is a paragraph on litter quality (which is likely to change with CC and increase in CO2 level). As we do not quite know how grassland will reaction in the future, So I recommend authors to add some lines on what we know from other CC experiments with grassland, litter quality, etc. . .

In objectives (P10490), authors highlight "priming effect" (P10490L21) this was not mention before and is neither introduced nor discussed. . . .. So up to authors to either take this subject better into account or to reword. Along the same lines, priming effect, this effect depends on litter quality, soil conditions and microbial pools. Authors do not mention at all changes in soil conditions with respect to CC.

I also miss some lines on how grassland store C. . .. this is mostly through root biomass than aboveground litter. According to objectives authors like to asses the relationship between litter additions and the plant biomass response (P10490L24). However, data analyses in this direction were made and reader can not determine if the relation is linear or not (see comments to possible graphs). A long the same lines I miss some correlation analyses between litter quantity (e.g. amount of nutrients added) and biomass, soil, microbs ect. . .. From Bar graphs reader can not conclude on regressions, bar seem to increase with quantity added!!!

M&M needs several points to get clarified as reader get no information . . ..what about climatic conditions out of growing season, and how this might affect litter decomposition . Is there an agricultural management on that site? 1000g/m2 biomass production = > 10t DM/ha this is quite high for the low fertility of the soil

Results Effects of litter input seem to be related to amount of input. I wonder how would look a dot-graph having the nutrient (or DM) input on the X-axis and le results Fig 2a,c on the Y. Idem plotting inorganic soil N (x-axis) with results of 3a,b and so on

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y-axis to see if there is any relation between quantity and effect. P10490L24 non-linear relationship between litter addi- tions and the plant biomass response.

Discussion -I miss some discussion on the effects of litter quality (and soil climate) on decomposition (turnover time of litter ect). These topics needs to be mentioned somewhere (P10497L20ff??).... It's not that because more is available more is decomposed.... Thus a real litterbag experiment would have been nice. -As litter was inserted to 10-20cm litter incorporation is an issue as well.

-I wonder if authors ca add un paragraph on some mechanisms, future processes... some thoughts here: Are the applied litter amendments realistic in the future? What is the future climate in this region? (more rain, T??) How do authors expect the vegetation will change. Future variation of litter input?? What about soil C stock?

Conclusion Conclusion mention topics which were not tackled before neither intro nor discussion: such as increase in biomass production (eg quantity) , changes in soil climatic conditions and CO2.... with future climate (see comments to intro). So as said before these I suggest to add some lines at the mentioned places. As also said befor , reader ca not conclude on in terms of stoichiometry and this resilience as no relation between litter inputs and plant growth etc were shown.

Specific comments P10488L7 what kind of litter, quality/N? Amounts? How can we scale them? Is this twice, 4, 5 times as much as expected for this steppe? Replace with " correspond to litter input increases of 15, 30, 60 and 120 % respectively"" here L13 future prediction? This is strange, not measured? L14 high litter additions of what quality? I am not sure that authors will find the same with low quality+ P10490-L13ff to me objectives are quite similar and might be merged in on sentence Not sure that 3 objectives are needed here, might also be skipped L21 priming was not mention before and is not introduced.... So up to authors to either take this subject better into account or to reword P10491 -L2ff suggest to describe the climate with some words, as compared to other places it's dry and cold. What happens in out of growing season ? L15ff

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the same for soil, BD in which soil layer, soil seems with very low C/N content, what about soil depth? L25-1000g/m2 biomass production = > 10t DM/ha this is quite high for the low fertility of the soil Is there an agricultural management on that site? P10492 -L3f “fresh organic matter to the soil in the 10–20 cm soil layer, at rates. . .” what type of litter, senescent, green, ??? move L9” fresh organic matter consisted of senescent above-ground tissues” higher equivalent to 0 (control treatment), 150, 300, 600 and 1200 g (dry mass -L7 “et primary production is assumed to increase between 10 and 60 %...” in this place? Fig 2a/b, 3a reduce Y-acis to max 3 (N) and 1 (P) to better see treatments effects Fig 4 may go to supplementary, results may be mentioned in the text say that belowground biomass was 6 times higher etc P10496-L24ff suggest to reword: “ Litter amendments are substantial supply of nutrients, suggested to release nutrients during decomposition. Results show, that availability of N and P, were only modiïňĄed for the two highest inputs treatment. Additionally, high litter addition also greatly increased soil microbial biomass C and N, indicating that soil microbial biomass does plays and activit role in nutrient transformation, conservation, and availability to plants (Wardle, 1992; Zaman et al., 1999; Tu et al., 2003). Notably, for more moderate litter additions, the observed e ïňĂ ect on plant biomass was quite limited, suggesting that only the plant did not beneïňĄt from these inputs. Indeed, litter addition signiïňĄcantly increased aboveground biomass in 2009, 2010 and 2011, and belowground biomass and total biomass in 2010 and 2011 but only for the highest input level. P20497L19” . . .eïňČcient in using nutrient resources.”” Not clear L26ff suggest to reword an merge with 4.2 “, those more favourable soil moisture conditions may have caused the higher soil nutrient availability via accelerated litter decomposition. Indeed, vegetation invested and allocated more biomass toward shoots than roots biomass allocation. In our study, high 5 litter addition decreased the ratio of belowground biomass to aboveground biomass, and the decrease reached a signiïňĄcant level in 2010. . . . Such an increase in photosyntates concentration is also explains the decline in C : N and C : P concentrations in aboveground biomass and litter upon high litter addition, but not for belowground biomass. 10498L14 “ Li and Xiao (2007) also found that the

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soil water content, soil organic matter, “ delete P10499LL14-17 delete this sentences has not its place here as the paper does not deals with fertilisation

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