I thank the authors for the updated version of the manuscript and their responses to some of the comments. Nevertheless, their responses to the comments are not point-by-point responses. Unfortunately, the authors have not addressed many of the comments. All the comments have not necessary to be accounted for in the revised version - if the authors think they are not relevant -, but a response would be welcomed at least for each of the comments not considered in the revised version of the manuscript.

We thank Ref#1 for their thorough review of our manuscript. We would like to apologise ofr the comments that were not addressed in the first round, we thought to have answered to all major comments, and directly changed the minor comments we agreed. However, at the reading of the present review we understand that many points needed to be answered in more details and that we had mistakenly omitted certain remarks. We have attempted to address them here in a comprehensive way. Overall we feel that these comments have increased the manuscripts' quality and we are very grateful to ref#1 for their work.

Here is the list of comments that have not been addressed in the author's responses, with lines numbering referring to the updated version of the manuscript:

Line 9: Please rephrase "of wood productivity, growth, NPP" as it is unclear. In addition, a coordinating conjunction (such as "and" or "or") is usually put prior the last term of a list. Could it be rephrased as "of NPP or wood growth" ?

In agreement with this advice we rephrased it to *"limitation of NPP or wood growth"* in the revised manuscript (L. 9).

Lines 49-52: there is an editing problem. Twice "through its role as an enzyme co-factor or its effect on cell turgor pressure (Battie-Laclau et al., 2013)"

The occurrence of this sentence between parenthesis was removed from the revised manuscript (L. 51).

Line 172, equation (11): why expressing MRNtrunk in "mol CO2" and not in "gC" ? In all cases, you may put the different conversion factors in the terms of the max function. To be more explicit why not expressing MRN as max(P1, P2-P3 x Btrunk) with P1 and P2 expressed in gC gN-1 hr-1 (or molCO2 gN-1 hr-1) and P3 expressed in (m2 gN-1 hr-1) (or in m2 molCO2 gC-1 gN-1 hr-1). Could you check the homogeneity of the equation ? In your response, could you specify the data from Ryan et al. (2009) used for setting this equation (and how you use it) ? As far as I understood, Ryan et al. reported values in mol or µmol CO2. So, why dividing by the molar mass of C if you want to express MRN in mol CO2 ?

Thank you for this comment that mirrors the crucial point that was underlined in the first round of reviews. The equations have now been changed to be in gC.m-2.day-1 and the different factors have been integrated as R1, R2 and R3, as suggested by Ref#1. The values that were used from Ryan were the intercept values in theirTab.1. These values were age-dependent. To be able to use them as a function of tree biomass, these values were converted assuming a constant N trunk of 0.0016 gN.gC-1 in Ryan et al., 2009 (using concentrations measured at our site that show that N_trunk very quickly reaches its minimum asymptot and the trees' biomasses at the different ages, see Fig. S2). The results that we see in terms of response of trunk respiration to trunk biomass between oK and +K treatments were consistent with measurements conducted at the Itatinga site (unpublished to

date). Using an age-based relationship would not have allowed for a biomass dynamic respiration rate and would maintenance respiration would have been insensitive to the state of the plantation.

The equation now reads (L. 171-176):

$$MRN_{trunk} = max\left(R_1^{trunk},\ R_2^{trunk} - R_3^{trunk} \times B_{trunk}\right) \quad (11)$$

Line 174: replace “hour, 12” by “hour and 12”

This was replaced in the revised manuscript.

Line 176: “Assuming a C content of 50%,”. This has been added following one of my comments. I was pointed the equations defining Ntrunk and Nbranches , not Nroot . You can remove this information, useless for Nroot. Related to this comment, although it’s not highlighted in your responses, I saw you revised equation 12 (formerly eq. 10) by removing a factor “0.5”. Should I conclude of this that the “N concentration in wood (%)” (y-axis of Figure S2) corresponds indeed to a N concentration in wood Carbon (%) (or to a N/C ratio expressed as a %) and not to a N concentration in wood biomass ? Please clarify.

We took note of this remark in our revised manuscript and revised supplementary material section. This inconsistency in our units was apparent in our manuscript, but did not mirror the code which was correct (and alternates between variables ain gDM.m-2 and gC.m-2 using the appropriate conversions). All figures with concentrations and all parameter values have been retranscribed using gN(or gK).gC^-1 as function of biomasses in gC.m^-2. This was applied to Figs.5, S2 and S5 as well as parameter values for eqs. 12, 17, 18, 19. We thank reviewer #1 for this remark that greatly contributes to the manuscript’s readability.

Line 185: Isn’t there a “m-2” missing in the units of RM_organ ? Please check the homogeneity of the equation.

Yes, indeed the m-2 is missing in the units of RM_organ which now reads (gC.hr-1.m-2) at L. 186.

Line 205-284, Section 2.6: I think you can re-structure this section in two, one dedicated to ‘K allocation’ and another to ‘K remobilization’ (currently subsection 2.6.5). Subsections 2.6.1 to 2.6.4 are only related to allocation.
Paragraphs between line 240 and line 253 could be moved in a new section on ‘K remobilization’.

Thank you for this interesting suggestion. This was applied in the revised manuscript at L. 204-286. We named the new section *“K remobilisation and turnover”*.

Line 224, equation (16): What’s the link between eq (16) and eq. (21) of Part1. To my understanding, the use of Lim^K_org assumes that K_phloem->leaf has been deduced first from K_available,phloem which is not mention in the text. Would not be more consistent with Cornut et al. (2013) (Part 1) and clearer, to use L_K in Part 2 as well, and not Lim^K_org ?

Yes, using that formulation would have been clearer since eq(16) and eq.(21) of Part1 are the same. It was duplicated to increase the readability of Part2. We have applied your recommendations and the equation in the revised manuscript now reads:

$$L_K = \frac{min\left(K_{available}, K_{NPP}\right)}{K_{NPP} + K_{Leaf}^{Demand}} \quad (16)$$

where $K_{available}$ was from eq. 15, K_{NPP} (gK.m^{-2}.day^{-1}) the amount of K needed for optimal stoichiometry of newly formed woody organs (eq.14) and K_{Leaf}^{Demand} (gK.m^{-2}.day^{-1}) the leaf growth K demand (Cornut et al., 2023). The cycle of K in the leaves is described in Cornut et al. (2023) since it is an integral part of the canopy cohort model.

Line 283: Please, give units to Rkbranches

Rkbranches is unitless, this was added to the revised manuscript (L. 288).

Line 288: “m-2”, please put “-2” in uppercase.

This was updated in the revised manuscript (L. 293).

Line 297: “bloc”. Should this not be written “block” ?

Yes, occurrences of “blocs” were changed to blocks in the revised manuscript (L. 302).

Lines 301 to 321: There is probably a problem with the numbering of section 2.9 and subsections 2.9.1 to 2.9.3: 2.9 -> 2.8.1 ; 2.9.1 -> 2.8.2 ; 2.9.2 -> 2.8.3 ; 2.9.3 -> 2.8.4

This was corrected to the following structure in the revised manuscript: 2.8, 2.8.1, 2.8.2, 2.8.3, 2.8.4 (L. 300-328).

Line 301-303: name explicitly and define the different CUE you use in the Results section : CUE_NPP, CUE_trunk, ; I think you only report CUE values in the Result for the full rotation period by computed a mean CUE as the cumulated NPP divided by the cumulated GPP. If this is correct, specify it here (and also for WUE).

The carbon use efficiency paragraph was complemented in the revised manuscript (L. 307-309): “*The carbon-use efficiencies (CUE) were calculated as the considered simulated C-flux summed over the whole rotation (CUE_NPP for NPP and CUE_trunk for trunk NPP) divided by the simulated GPP flux summed over the whole rotation (De Lucia et al., 2007). It is in fact a measure of the proportion of assimilated carbon that was used for forming new tissues, i.e. not re-emitted through autotrophic respiration.*”

Line 305-306: define also here WUE_GPP for which you report values in the Results section.

We have modified the paragraph to read: “*The water use efficiencies of NPP (WUE_NPP), trunk NPP (WUE_trunk) and GPP (WUE_GPP) were calculated by dividing the total NPP, trunk NPP and GPP, respectively, by the amount of transpired water during the period over which NPP, trunk NPP and GPP were calculated.*” (L. 311-313).

Line 309: “C-based metric” may refer to CUE; you may replace it by “C flux”

Thank you for this suggestion, we have updated the revised manuscript with “C flux” (L. 316).

Line 323: replace “and dividing it” by “divided”

Thank you for this suggestion we have updated the revised manuscript accordingly (L. 330).

Line 325, equation (23): K_fertiliser^added should be sum for t=0 to k as well, in particular to account for the fertiliser regime with 4 applications.

Thank you for this suggestion, while this was indeed the method used in our computations, it was not apparent in our manuscript. The revised manuscript equation 23 now reads (includes the sum and minor modifications to the units of K_fertiliser):

$$FUE^{f}_{NPP} = \frac{\sum_{i=0}^{k}(NPP^{f}_{i} - NPP^{oK}_{i})}{\sum_{i=0}^{k} K^{added}_{fertiliser,\,i}} \quad (23)$$

where FUE^{f}_{NPP} (gC.gK^{-1}) the fertiliser use efficiency of NPP for a given level of fertilisation, k the number of days in the rotation (days), NPP^{f} (gC.m^{-2}.day^{-1}) the daily NPP of the currently considered stand, NPP^{oK} (gC.m^{-2}.day^{-1}) the NPP of the K omission stand and $K^{added}_{fertiliser,\,i}$ (gK.m^{-2}.day^{-1}) the amount of K fertiliser that was added at day i in the considered stand. To obtain FUE_{GPP} or FUE_{trunk}, this relationship can be applied to either GPP or NPP_{trunk}, respectively.

Line 335: “Table 2”, I think you want to refer to “Table 3” of Cornut et al., 2023, not Table 2

Yes indeed, we have modified the revised manuscript to table 3 (L. 335).

Line 338: replace “trunk NPP_trunk” by “NPP_trunk”

Yes, we have now modified the text accordingly (L. 342).

Line 340: add a “,” after “stand”.

Yes, we have now modified the text accordingly (L.349)

Line 344: replace “age 59 months” by “month 59 after planting”

Yes, we have now modified the text accordingly (L.351)

Line 349: replace “carbon use efficiency (defined as the ration of NPP to GPP)” by “CUE_NPP”

Yes, we have now modified the text accordingly (L.356)

Line 350: replace “0.52 vs 0.40” by “0.40 vs 0.52”

Yes, we have now modified the text accordingly (L.357)

Line 352: replace “CUE” by “CUE_NPP”

Yes, we have now modified the text accordingly (L.359)

Line 354: add “relative” before “increase”

Yes, we have now modified the text accordingly (L.361)

Line 355-356: “This was further amplified by leaf NPP representing 13% of GPP in oK compared to 7% in +K”. Is this remark related to the difference in CUEtrunk, CUE_NPP ? Please specify.

This sentence was aimed at CUE_trunk and was modified to reflect this: "*For CUE_trunk, this was further amplified by leaf NPP representing 13% of GPP in oK compared to 7% in +K.*" (L. 362)

Line 361: replace "0, 3, 10 and 20 months of age" by "month 0, 3, 10 and 20 after planting"

Yes, we have now modified the text accordingly (L.368)

Line 369: add "located in" between "were" and "the".

Yes, we have now modified the text accordingly (L.376)

Line 379: add a comma after "model".

Yes, we have now modified the text accordingly (L.386)

Figure 2: y-labels could be bigger.

The y-labels for NPP values were increased in the revised manuscript.

Figure S2 b), replace "wood" by "trunk" in the Y-label

Yes, this was done in the revised manuscript (Fig. S2). The section concerning trunk wood was also edited to read wood trunk instead of wood.