

Interactive comment on “Carbon isotope discrimination during litter decomposition can be explained by selective use of substrate with differing $\delta^{13}\text{C}$ ” by J. Ngao and M. F. Cotrufo

Anonymous Referee #2

Received and published: 4 February 2011

Sometimes you have what seems like a good idea for an investigation but in the end it turns out that the experiment did not work as expected. I'm afraid that is the case with the experiment in this manuscript. The final concluding result, Figure 7, shows that the statement in the title is not correct. What is needed to explain the observed isotopic signature of the evolved CO₂ are supplementary hypotheses about time varying discrimination factors. The problem with these factors is that they are entirely arbitrary and without coupling to biological phenomena. As a result the analysis degrades to an exercise in curve fitting without explanatory power. As a further indication of the problematic

C55

interpretation of the results is the shift in isotopic composition of $\delta^{13}\text{C}$ -cellulose (Figure 4). $\delta^{13}\text{C}$ -cellulose should be a well-defined chemical component and yet it changes strongly in isotopic composition during the experiment. It is not clear if this is a result of the extraction procedure that extracts not just $\delta^{13}\text{C}$ -cellulose but different compounds at different times or if it is a result of differential use of C isotopes in $\delta^{13}\text{C}$ -cellulose. If the latter is the case, then it might not be the selective use of substrates but the selective use of isotopes of substrates that explains the observations.

However, even an experiment that produces results contrary to the original hypotheses may be useful if the deviations can be explained and provides help to others doing similar experiments. At the end the authors indicate some ideas of that kind but I do not think they go far enough to motivate the publication of this manuscript.

I have another concern about the value of this manuscript. How could the result from this study be extrapolated to much longer time scales such that the result could be applied to the entire C pool in the soil?

Interactive comment on Biogeosciences Discuss., 8, 51, 2011.

C56