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David A. Wardle,* Marie-Charlotte Nilsson, Olle Zackrisson

We find the suggestion that substantial charcoal loss occurred in the humus-charcoal mixtures implausible and discuss why complexing of soluble carbon released from the mixtures by underlying mineral soil should be minor. This exchange highlights our limited knowledge about charcoal effects on native soil carbon, indicating that strong advocacy for charcoal addition to offset CO_2 emissions remains premature.

We recently reported that fire-derived charcoal can promote rapid loss of forest humus in boreal forests (*1*). Lehmann and Sohi (*2*) raise two issues regarding the interpretation of our results. The first issue is that the accelerated mass loss in the mesh bags containing a mixture of humus and charcoal could have been due to decomposition of some unspecified labile component in charcoal. We believe that this explanation is implausible. First, our experiment also included mesh bags containing only charcoal that was placed in intimate contact with the surrounding humus for 10 years and which showed insignificant mass loss over that time—not a result that would be expected if there were a substantial labile pool of carbon (C) in the charcoal. Second, there is no evidence [including in the references cited in (*2*)] of the existence of a labile pool of C in charcoal that is large enough to explain the magnitude of accelerated mass loss in the mixture bags. Third, the fact that most of the effects we reported occurred in the initial part of the experiment has no bearing on their argument. The mass of decomposing organic materials nearly always shows a negative exponential relationship with time (*3*), and our finding of greater mass loss in the humus and mixture bags (and greater net divergence between observed and expected values in the mixture bags) in the first year than in subsequent years is therefore inevitable.

The second issue raised by Lehmann and Sohi (*2*) is that we did not quantify the proportion of C lost from the litter bags as CO_2 versus that in other forms, a point that we freely acknowledge in (*1*) (i.e., "…greater mass and C loss [in the mixture bags] through either greater respiration or greater leaching of soluble compounds"). However, we maintain that a considerable proportion of this lost C must have been lost as CO_2. We found, as have others (*4*–*6*), that charcoal greatly promotes microbial growth and activity. This in turn must involve greater microbial use of native organic matter, which would therefore cause a greater amount of native organic C to be respired as CO_2. Further, it is unlikely that much of the soluble C produced in the bags in our study would have been complexed and stabilized in the mineral soil layer underlying the humus, for two reasons. First, given the great sorption capacity of charcoal for a variety of organic compounds (*6*, *7*), much of the soluble C formed in the bags may well have been adsorbed by the charcoal in the bags rather than exported to the mineral soil layer and adsorbed there. Second, mineral soils formed from postglacial till that underlie the humus layer in northern European boreal forests are coarse-textured with low clay contents (*8*–*10*), meaning that they would have a low capacity to complex soluble C exported from the bags in any case. We recognize, however, that complexing of leached C on mineral surfaces could be more important in soils with a high clay content, and when the charcoal is in intimate contact with the mineral soil layer rather than spatially separated from it, and that this may warrant further study.

We make one final point. Because of charcoal's persistence in soil and its potential to sequester C in the soil in the long term, various commentators have highlighted the potential of charcoal or biochar to offset increasing atmospheric CO_2 concentrations (*11*) and proposed its inclusion in emissions trading schemes (*12*). However, as both our study (*1*) and the comment by Lehmann and Sohi (*2*) illustrate, much remains unknown about how charcoal influences the dynamics of native soil organic C and its loss as CO_2. As long as this remains the case, strong advocacy for the addition of charcoal or biochar to soil to offset human-induced CO_2 emissions remains premature.

Department of Forest Ecology and Management, Swedish University of Agricultural Sciences, SE901-83 Umeå, Sweden.

*To whom correspondence should be addressed. E-mail: david.wardle@svek.slu.se

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