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Interactive comment on "Biological enhancement of mineral weathering by *Pinus sylvestris* seedlings – effects of plants, ectomycorrhizal fungi, and elevated CO_2" *by* Nicholas P. Rosenstock et al.

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This paper has dealt with effects of plant, mycorrhiza, and future climate (elevated CO2) on mineral weathering using seedling column study. The experiment was welldesign and conducted to evaluate effects of mycorrhizal association and CO2 elevation on mineral weathering rates in soil. Discussion on mineral weathering is reasonable, except for one critical issue. Major issue: I am afraid of underestimation of weathering rate of Si or Si uptake by plants in this study. Plant Si uptake or Si concentration in plant materials could not be determined only by acid digestion. The majority of Si will remain

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Discussion paper

as residue in acid solution and the residue need to be included as Si uptake by plants. This problem has already been raised by VC Farmer. The Si solubility increases with increasing pH. This can explain the greater Si weathering in the planted column with the higher pH. If actual plant Si uptake is considered, Si weathering in planted column will be further greater. Minor issue: The dominant low molecular weight organic acids detected in this study are formic, lactic, and acetic acids. They are relatively weak agents for mineral weathering, compared to chelating oxalic and citric acids that are well-known to contribute to mineral weathering in podzol E horizon. Is there any idea to explain the difference of root exudates between the previous studies (e.g., Ahonen-Jonnarth et al., 2000) and this study? Possible reasons may be high availability of P in added solution, low Al levels in soil solution, and precipitation of Ca oxalate. Reasoning is beneficial to generalize the result obtained. The function of formic acid, the dominant organic acid in this study, by roots needs to be further discussed. Most data are presented on a basis of column. I wonder whether the results could be transformed and presented in a generalized manner to compare with the previous studies. Reference Ahonen-Jonnarth, U., Van Hees, P. A., LUNDSTRÖM, U. S., & Finlay, R. D. (2000). Organic acids produced by mycorrhizal Pinus sylvestris exposed to elevated aluminium and heavy metal concentrations. The New Phytologist, 146(3), 557-567.

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