

# ***Interactive comment on “Low molecular weight organic anions (carboxylates) increase microbial activity and alter microbial community composition in uncontaminated and diesel contaminated soil” by B. C. Martin et al.***

## **Anonymous Referee #1**

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This article attempts to address an issue regarding phytoremediation of petroleum hydrocarbon (PHC) contaminated soils. The authors use microcosms with one or two carboxylates and test the effects on microbial community structure, activity, and PHC degradation. Hypotheses are clearly stated and the paper is straightforward and well written. However, as detailed below, the paper is extremely limited in scope, with only 1 soil and 2 carboxylates studied.

1. The authors appear to be treating this as a model system for rhizosphere activity and phytoremediation rather than a test of a simple process for remediation by direct

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addition of carboxylates to contaminated soil. While the authors do discuss the limitations of the study on page 10, the experiment is so simplistic as to be of very limited value. At the very least, we would have liked to have seen, as one treatment, a more complex mixture of carboxylic acids, amino acids, and carbohydrates, all of which are substrates for microbial growth, and which would be more representative of a real rhizosphere exudate. If the authors were determined to only study carboxylates, which we see no justification for, then a wider range of carboxylates including a complex mixture of many carboxylates found in rhizosphere exudates would have been an improvement.

2. The title of the paper “Low molecular weight organic anions...” suggests that the results of this paper are general enough to apply to a wide range of carboxylates. But the authors only tested two carboxylates, hardly enough to generalize from. The authors should consider rewriting the title to make it more specific.

3. Only one soil was studied. Therefore, the results of this study can only be applied to that one soil. The study would be vastly improved by conducting it across a range of soil types and edaphic soil properties.

4. page 3 – soil type must be specified.

5. The concentration of diesel and of organic acids used in the experiment should be justified. Why were these concentrations chosen, and are they in any way realistic?

6. The role of pH in controlling microbial communities cannot be overstated. Two more recent references are: Lauber, C.L., Hamady, M., Knight, R., Fierer, N., 2009. Pyrosequencing-Based Assessment of Soil pH as a Predictor of Soil Bacterial Community Structure at the Continental Scale. *Applied and Environmental Microbiology* 75, 5111-5120. Rousk, J., Baath, E., Brookes, P.C., Lauber, C.L., Lozupone, C., Caporaso, J.G., Knight, R., Fierer, N., 2010. Soil bacterial and fungal communities across a pH gradient in an arable soil. *ISME J* 4, 1340-1351.

7. On page 10 you state that “further investigation is warranted...”. While further

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investigation is certainly warranted into the role of rhizosphere exudates on microbial community structure and function, including but not limited to carboxylates, it is not at all clear from the results of this paper that there is any need to continue looking at the effects of carboxylates on PHC degradation.

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