

Household Anthropogenic Pollutants Against Soil Respiration

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Macroscopic organisms have been largely studied for carbon dioxide release rate and the effect that human development has had on these rates. However, the majority of biomass on Earth is microbes found on the Earth's surface, in the waterways and in soil. As for pollution, a single drop of weak acid on the skin is unlikely to kill on a large animal, yet this could be catastrophic to a colony of microbes. This experiment studied the effect of anthropogenic pollution on soil respiration using toxins that could easily infiltrate our soil and water systems. This project specifically examined common household chemicals in conjunction with Putah Creek soil. The tested toxins were Mobil 1 motor oil, Windex window cleaner, Ajax dish soap, and Dawn antibacterial dish soap. Six samples of Putah Creek soil were collected in jars. Four soil samples were exposed to toxins, while the remaining two were the control and glucose replicates. The control included soil damped by water, while the glucose replicate included both water and glucose. The glucose replicate was included because of its known ability to encourage respiration. A 20mL NaCl base trap was added to each jar before being sealed. The jars were aerated once a week before titration. The 1.0N NaCl from each jar of each week was titrated with 0.5 N HCl. The initial prediction for this experiment was that the glucose would raise the respiration levels, and that the control with no glucose would fall. Five weeks of recording the respiration levels led to the observation that household toxins are detrimental to the soil microbial community over time. A similar experiment employed heavy metals instead of household toxins. The experiment showed that soil respiration and ATP content were strongly affected by the heavy metal content present in the soil. (P. T. Vanhala, J. H. Ahtiainen, 2006). This project will raise awareness of the negative effect of improper disposal of seemingly harmless materials. The next step of the project would be to compare the effect of similar toxins on soil respiration in different habitats. This would indicate that soil microbes are more or less acclimated to human-made toxins depending on the exposure or proximity to human development.