

Sirinya Frankel

*The Effect of Impermeable Surfaces on Soil Biodiversity*

This experiment studied the effects of the impermeable surfaces commonly used in infrastructure on soil bacterial biodiversity. Soil is one of the largest carbon reservoirs on Earth. Healthy, diverse soil has the potential to mitigate climate change. Soil samples were kept under varying conditions, intended to model real-world scenarios. Some samples were completely covered with either cold asphalt or concrete, whereas others were two-thirds covered by cold asphalt or concrete with the middle third being either completely bare soil or sod such that the impermeable surfaces were disrupted. Controls were either completely bare soil, or completely covered in sod. After two weeks of samples being under their respective conditions, the pH of each sample was measured using pH paper weekly for five weeks. The pH of each sample was used as a surrogate marker for bacterial biodiversity. Control samples with continuous sod had pH measurements closest to neutral, indicating greater biodiversity, whereas the samples completely covered with impermeable surfaces had the most acidic pH, indicating lower levels of bacterial biodiversity. Samples with a disrupted surface had an intermediate pH suggesting that the presence of sod or soil improved bacterial biodiversity. These results support my hypothesis that uninterrupted impermeable surfaces would result in decreased soil bacterial biodiversity, but this could be improved with interruptions in the surfaces with bare soil or sod. Simple actions, such as adding medians to more roads, may be taken to improve biodiversity in the soil underneath common infrastructure, which can help to mitigate climate change.