

Department of Biological Sciences

Giulia Orazi

Mentor: Krista McGuire

Seasonal and Geographical Variation of Microbial Abundance and Community Composition in New York City Green Roofs and Parks

Although microorganisms are known to inhabit nearly every environment on Earth, very little is known about microbial diversity in human-dominated ecosystems. Since fungi and bacteria perform crucial functions in biogeochemical cycles and serve as major decomposers, it is imperative to study the microbial community in order to understand how they function in a particular environment. One environment of recent interest has been green roofs, which are roofs of buildings covered with vegetation. Green roofs provide many advantages, such as reducing air pollution, decreasing storm water runoff, and minimizing the urban heat-island effect. Recent research has discovered that green roofs harbor diverse microbial assemblages, but only one study has been performed at this point and it did not examine seasonality. It is important to evaluate which microbial groups are present in each season in order to better understand their roles in the green roof ecosystem. This current study examined whether microbial biomass and community composition in New York City green roofs change spatially and temporally, using neighboring ground-level parks for comparison. Substrate samples were obtained from three green roofs planted with the same two native plant communities and soil samples were collected from three parks during three different seasons. Phospholipid Fatty Acid Analysis was used to quantify microbial biomass and provide a coarse profile of community composition. Total microbial biomass was found to be higher in green roofs compared to parks. Microbial communities clustered by roof and park site, indicating that community composition varied by geographical location. Green roof and park samples also showed considerable seasonal variation, but did not cluster by plant community. This study found that green roof microbial assemblages are dynamic and spatially distinct. Future efforts should investigate the actual ecosystem functions of microbial communities in the green roof environment.