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The Ecological Function of Green Roofs in New York City

Green roofs contain vegetated soil plots that cover some or all of the roof surface. The primary focus of green roof research conducted thus far has been their heat-flux benefits for insulating and cooling buildings and their stormwater management capabilities that reduce stress on urban wastewater removal systems. Although green roofs are relatively well-studied from an engineering perspective, they have received little attention from the biological research community, particularly with their potential application as biodiversity corridors. This study addresses that deficit by examining the biodiversity of microbial communities in green roofs in New York City. As urban sustainability becomes a greater public priority, green roofs can play a more significant role in reducing cities' ecological footprints. By serving as corridors allowing organisms to migrate across developed urban landscapes, green roofs can potentially alter how cities influence surrounding ecosystems. Highly diverse microbial communities are associated with more rapid nutrient cycling in soil, which is in turn often associated with high floral and faunal diversity. This study seeks to gain preliminary data about the composition of microbial communities on green roofs in New York City and to compare the diversity of communities on roofs planted with native floral species to those planted with non-native vegetation. Soil samples were collected from eighteen roofs in July of 2010 in all five boroughs of New York City. Sampled roofs included those with native vegetation, those with non-native vegetation and bare roofs containing soil plots that were not yet planted. Phospholipid fatty acid analyses were performed on a subset of samples from each roof to determine the presence and abundance of actinobacteria, gram-negative bacteria, gram-positive bacteria, general bacteria and fungi in the soil. Gas chromatography was used to analyze the extracted phospholipids. Data are currently being processed, and will show the abundance of each microbial group on each roof so that different roof types can be compared. Future research on green roof microbiology could include DNA sequencing to identify the full extent of microbial taxa found on the roofs, as well as migration patterns of air-borne microbes as they move across the city through green roofs.