

The Impact on Bacterial Diversity and Abundance of Varied Nitrogen Treatments in a Rooftop Farming System

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As the urban population continues to increase, it is necessary to consider the potential behind green roof agriculture. As agricultural systems require increased nutrients to maximize crop yield, it is important to understand the potential benefits and effects of using nitrogen-based fertilizer treatments in an urban setting. As microbial communities control nutrient cycling in an ecosystem, supplementing an agricultural system with nitrogen-based fertilizers can affect the diversity and abundance of microbes. Using real-time quantitative polymerase-chain reaction (qPCR), it is possible to determine the total bacterial abundance through the quantification of the 16s rRNA gene. This will demonstrate the impact of different nitrogen additions on microbial communities within rooftop farm systems. Analyzing the ratios of ammonia oxidizing bacteria (AOB) and denitrifying bacteria compared to the 16s rRNA total bacterial abundance will provide information on the role of AOB and denitrifying bacteria in urban rooftop farm systems (Kong, 2010). The quantification of the bacterial diversity further provides information on nitrogen leaching and the release of Nitrous Oxide (N₂O), a harmful greenhouse gas, into the atmosphere as a result of amending green roof growing media with nitrogen-rich fertilizers. Samples were obtained from a controlled 8-week experiment conducted during the summer of 2012 following the growing season of *Beta vulgaris* (Swiss chard). Green roof growing media was amended with one of four fertilizer treatments: Stone Barns Center for Food and Agriculture chicken manure compost, composted greenwaste from the NYC Department of Sanitation, vermicompost from the Lower East Side Ecology Center, and Osmocote 14-14-14 Balanced Smart-Release Fertilizer. Preliminary 16s rRNA qPCR results illustrate a significant increase in the bacterial population from the initial across all treatments. The nitrogenous amendments featured a more sustained bacterial population, while the control experienced a drastic decrease in bacterial population by week 8. The project will continue into the fall 2013 semester.