

Uncovering Nitrifier Interactions in Urbanized Soils

Abstract

The recent discovery of ammonia-oxidizing archaea has challenged our understanding of the microorganisms involved in nitrogen (N) cycling. For decades, it was thought that only bacteria had the ability to oxidize ammonia, the rate-limiting step of nitrification. It has been shown that ammonia-oxidizing archaea (AOA) can be more abundant in soil than their bacterial counterparts (AOB), suggesting a potential contribution to nitrification from the former. Little is known about the distribution of AOA in soil and their relationship with AOB. Given that ammonia-oxidizing microorganisms compete for the same substrate (ammonium), I hypothesize that both groups occupy different niches within the soil profile. Understanding the factors that affect nitrifier distribution and activity can lead to improved N management in urban soils. The objectives of this study are: i) to answer the fundamental question of how AOA and AOB interact and are distributed in soil; and ii) to investigate how ammonia-oxidizers respond to change in the soil habitat resulting from plant removal and mulching, increases in water content, and ammonium enrichment.