Importance of nitrifier denitrification for nitrous oxide production. (S03-wrage055039-Oral)

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Abstract:

Nitrous oxide (N2O) is an important greenhouse gas. Its largest single source is agriculture, where it is produced by different microbial processes, including nitrification. Two pathways can lead to the development of N2O in nitrification: 1) hydroxylamine decomposition, which is similar to chemodenitrification, and 2) nitrifier denitrification, the reduction of nitrite by nitrifiers. To distinguish between these pathways and other processes leading to N2O production, combinations of inhibitors have been used. Oxygen (O2) in high concentrations suppresses nitrifier denitrification and denitrification. Low concentrations of acetylene (C2H2) inhibit ammonia oxidation and thus both hydroxylamine decomposition and nitrifier denitrification. Since the use of these inhibitors in soil studies led to doubts concerning their effectiveness, experiments with C2H2 and O2 alone and in combination were carried out in pure cultures of different ammonia-oxidising bacteria. The results show that our understanding of nitrification and the working of the inhibitors is far from complete. Furthermore, they imply that nitrification might have been underestimated as a source of N2O.

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