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PILOT SCALE BIOAUGMENTATION FOR REMOVING NITROUS OXIDE (N_2O) USING A DENITRIFYING BACTERIUM *Pseudomonas stutzeri* STRAIN TR2: A CASE STUDY

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Abstract

Pseudomonas stutzeri TR2 is a unique denitrifying bacterium, which quickly adapts to denitrifying conditions even in the presence of oxygen and readily reduces nitrous oxide (N_2O). The strain TR2 has been therefore considered to be a prospective candidate for bioaugmentation aiming to reduce N_2O emission from nitrogen removal processes in the wastewater treatment systems. Here, we report a case study of bioaugmentation using a pilot-scale denitrifying reactor, where we monitored changes in N_2O emission and survivability of the inoculated *P. stutzeri* strain TR2. In the first inoculation, the strain TR2 in the activated sludge disappeared within a few days, while there was an initial N_2O reduction in appearance. Laboratory investigation showed that *P. stutzeri* strain TR2 is able to grow at a higher range of temperature and survives well, when 5–10 mM nitrite was provided as denitrification substrate. In light of these findings, we raised the nitrite concentration and the temperature of the reactor, which is preferable for the growth of the strain TR2, but not for other bacteria and protozoa susceptible to nitrite toxicity and higher temperature. As a result, we observed that the strain TR2 survived in the activated sludge for more than 3 weeks, and that the N_2O emission from the reactor has been maintained at a lower level. This study illustrates the importance of applying an optimized condition for inculants against their competitors or predators to achieve successful bioaugmentation.