



Characteristics of actinomycetes producing geosmin in Paldang Lake, Korea

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ABSTRACT

Geosmin and 2-methylisoborneol (2-MIB) are organic compounds known to cause earthy and musty odors in drinking water. In Korea, during the summer of 2012, a geosmin outbreak in the drinking water supply prompted further research to identify the source of the odorous materials, since these occurrences were not well understood or monitored. The purpose of this study was to investigate how important a role actinomycetes play in the production of geosmin and 2-MIB in Paldang Lake by measurement of microbial density (the number of colony-forming units), pyrosequencing of 16S rRNA genes, and determination of the prevalence of the geosmin synthase gene. Three sampling sites (P1, P2, and P3) were selected. The increase in geosmin concentration was paralleled by an increase in actinomycetes (*Streptomyces* spp.) and cyanobacteria (*Anabaena* spp.) populations. The bacterial communities in Paldang Lake were characterized by 454 pyrosequencing based on 16S rRNA gene sequences. P1 (North Han River) showed the highest density of actinomycetes, followed by P2 (Paldang Dam), and P3 (South Han River). The density of *Streptomyces* spp. increased at P1, while that of cyanobacteria increased at P3. No significant density change was noted in those two species at P2, a confluence of two rivers. The genes producing geosmin or 2-MIB were detected in 60 single strains that were isolated from water samples in Paldang Lake. This study confirmed that *Streptomyces* spp. significantly affect the production of geosmin that causes odors in Paldang Lake.

Keywords: Actinomycetes; *Streptomyces* spp.; Geosmin; 2-MIB

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