



Filamentous Bacterial Community in Activated Sludge Process of Sewage treatment plant in Dubai, United Arab Emirates

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Abstract

In this study, filamentous bacterial community implicated in bulking and foaming problems in the sewage treatment plant in Dubai was characterized by direct microscopy and fluorescent in situ hybridization (FISH) technique over a period of six month. The key dominant bacteria identified from mixed liquor samples were Nocardioforms, *Thiothrix*, Eikelboom Type 021N, *Sphaerotilus natans*, *Beggiatoa* and *Nostocoida limicola* type I. FISH analysis successfully identified filamentous and non-filamentous forms of Nocardioforms group members. It was concluded that specific filamentous bacteria populations in mixed liquor and foaming activated sludge were constant and independent on variable wastewater characteristics.

Keywords: Activated sludge, Bulking, Foaming, Nocardioforms.

1. INTRODUCTION

Filamentous bacteria overgrowth is responsible for most severe operational problems like bulking and foaming in most of the activated sludge plants worldwide [1-5]. During bulking activated sludge biomass grow in volume with poor settling characteristics of sludge flocs, as a result most of the treated wastewater brings sludge flocs along with it, resulting in the poor efficiency of the treatment process. Similarly, during foaming, a thick scum layer is formed on the surface of settling sludge by the mycolic acid producing filamentous bacteria and this can lead to various operational problems during sludge dewatering and disposal [6-7]. A large number of diverse filamentous bacteria has been identified during surveys conducted in activated sludge plants in several countries included Nocardioforms group, *Microthrix parvicella*, *Sphaerotilus natans*, Eikelboom type 0041, *Thiothrix* (I, II), Eikelboom Type 021N, *Nostocoida limicola* (I, II & III) and *Beggiatoa* etc. [2,5,6,8,9].

Activated sludge plants in various other countries have been extensively studied [1,2,5,6] but very little or no information describing filamentous populations has been available on Sewage treatment plants in the UAE region. For effective long-term control of bulking, foaming and for the proper disposal of sludge material basic understanding of filamentous bacteria population specific to the treatment plant is required. Therefore, the main objective of this study was to identify and determine the dominance and frequency of occurrence of the filamentous bacterial population in mixed liquor, foaming/bulking sludge over a six month period using classical and modern molecular approaches.

2. MATERIALS AND METHODS

2.1. SAMPLE COLLECTION

The samples of mixed liquor and foam (250 ml) were collected from aeration tanks and secondary clarifier tanks from the activated sludge unit of Dubai sewage treatment plant (DSTP) located at Al Aweer in Dubai. Samples were taken on fortnightly basis beginning January 2007 till June, 2007 spanning between winter and summer period. After collection, samples were stored at 4°C and morphologically characterized within 24 hours of sampling.