Granular sequencing batch reactors (SBR) constitute a novel biofilm technology for the treatment of wastewaters. These bio reactor systems present high biomass retention and have especially gained interest during the last 5 years, after the observation that also heterotrophic aerobic bacteria can be grown in granules similar to anaerobic granular sludge reactors. Aerobic granular sludge is extremely promising for the treatment of effluents containing toxic compounds, and it can economically compete with conventional activated sludge systems. The use of organofluorine compounds has increased during the last century. Nevertheless, biodegradation of fluorinated compounds, among them fluorophenols, has been scarcely investigated. As these pollutants occur in wastewaters discontinuously and at low concentrations, maintenance of a good population of organofluorine compound degraders in bioreactors is highly desirable.

The main aim of this study was to investigate the robustness and performance of a laboratory scale SBR towards shock loadings of 2-fluorophenol (2FP). A stable operated SBR was, during ca 3 months, intermittently fed with 0.22 mM of 2FP added to an acetate containing medium. No biodegradation of the target compound was observed. Bioaugmentation with a specialised bacterial strain able to degrade 2FP was subsequently performed. The reactor was thereafter fed with 0.22-0.44 mM of 2FP for 7 months. Full degradation of the compound was reached, with a stoichiometric fluoride release. This indicates the need for bioaugmentation in cases where biodegradation of highly recalcitrant compounds is targeted. The success of augmentation was followed by molecular methods (DGGE, FISH) in order to clarify the role of the inoculated strain in the biodegradation process and the impact on the microbial community in the aerobic granules.

To our knowledge, this is the first study reporting bioaugmentation of aerobic granular sludge.

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