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STRATEGIES TO ENHANCE THE REMOVAL OF FLUOROQUINOLONES

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Fluoroquinolones (FQs) are broad-spectrum antibiotics that play an important role in the treatment of serious bacterial infections. Currently, several FQs are available but ciprofloxacin (CPF), ofloxacin (OFL) and norfloxacin (NOR) are amongst the most worldwide prescribed antibiotics. Antibiotics can reach wastewater treatment plants (WWTP) from different routes. Thus removal of these contaminants during the biotreatment process is of major importance in order to avoid their release to other environmental matrices.

Granular sludge sequencing batch reactors (SBR) constitute a novel biofilm technology for wastewater treatment extremely promising for the treatment of effluents containing toxic compounds. Therefore, in this study a granular sludge SBR, established with activated sludge from a WWTP, was operated for the treatment of an aqueous stream containing FQs. No evidence of FQ biodegradation followed by HPLC with Fluorescence Detection was observed but FQs adsorbed to the aerobic granular sludge, being gradually released into the medium after withdrawal of the FQs in the inlet stream.

In a previous study, *Labrys portucalensis* F11 demonstrated to be able to degrade FQs, namely OFL, NOR and CPF, when supplied individually or as a mixture, in the presence of an easy degradable carbon source. Different removal extents were obtained for the tested concentrations (ranging from 0.8 to 30 μM), but overall the uptake capacity of strain F11 for individual FQs decreased with increasing the initial FQ concentration. When supplied with a mixture FQs, strain F11 concomitantly removed each target antibiotic but a decrease on the biodegradability of FQs was observed which could be explained by competition mechanisms.

The ability of *Labrys portucalensis* F11 to grow using the readily available carbon source while maintain its ability to degrade FQs reinforce the potential of this strain in bioaugmentation processes. As the indigenous microbial communities in biotreatment processes rarely are able to remove such contaminants, using this promising FQ-degrading strain, bioaugmentation strategies such as inoculation of the degrading strain, as a suspension or immobilized on carrier material, or using a plasmid donor strain carrying the degradative genes, could be assessed to improve FQ removal.

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