

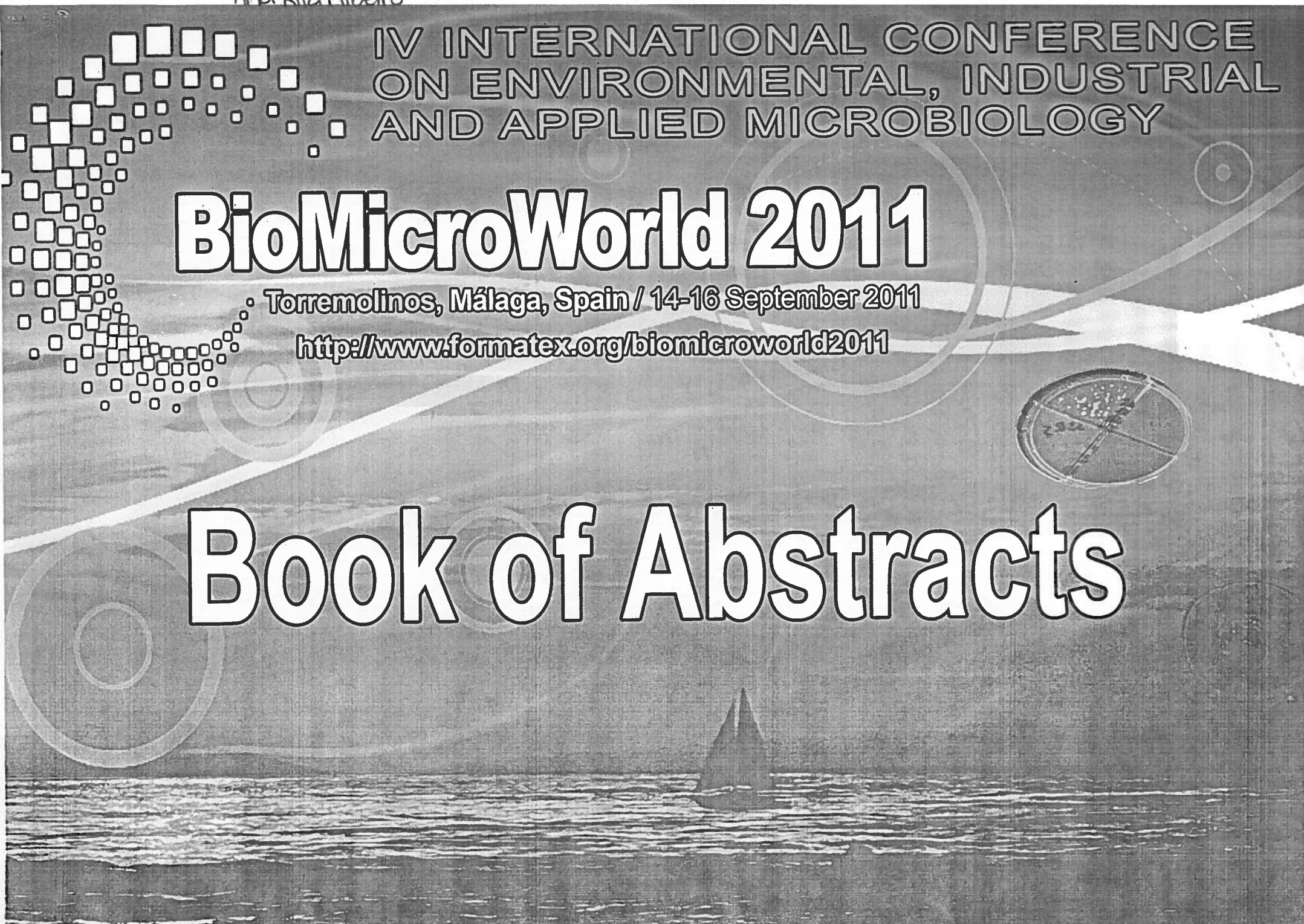
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Book of Abstracts



Biodegradation of atrazine and terbutryne by a mixed microbial community in a packed bed biofilm reactor

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Atrazine and terbutryne are triazine herbicides widely used for broad leaved weed control. Those herbicides have potential deleterious effects on aquatic systems. Their specific interference with photosynthetic electron transport and toxicity to primary producers in the trophic chain is well known. Due to their extended use in agriculture and to their persistence, atrazine and terbutryne have to be considered a potential risk for water life as well as for drinking water quality.

For the aerobic biodegradation of those herbicides, an internal airlift bioreactor (ALR) was constructed. The reactor's riser was packed with a porous support of volcanic stone fragments.

A bacterial community isolated from agricultural soils of Central Mexico formerly treated with triazine herbicides was used along this work. Selection process was carried out by the technique of microbial enrichment by successive culture transfer into mineral salt medium (MS) containing terbutryne and atrazine (21 mg L⁻¹ and 24 mg L⁻¹, respectively) as sole carbon and nitrogen source. The herbicide (Atermix), a commercial presentation used in Mexico, was diluted to obtain proper concentrations. The cultivable bacterial strains constituting the community were identified by sequence comparison of 16S rDNA amplicons. They were *Acinetobacter* sp. (NC014259.1; 96%), *Pseudomonas fluorescens* (NC007492.2; 96%), *Acinetobacter baumannii* (NC010611.1; 94%) and *Arthobacter* sp. (NC008541.1; 90%). In parentheses, the NCBI accession numbers and % of similitude are indicated.

The mixed bacteria culture was immobilized in the PB-ALR and operated by repeated batch and continuous culture and fed with MS medium containing terbutryne and atrazine (21 mg L⁻¹ and 24 mg L⁻¹, respectively) as carbon and nitrogen sources. The overall removal efficiency obtained with this community was in a range of 80 to 100%, determined by HPLC and by the decrease of the chemical oxygen demand. In addition, as an important byproduct, the cyanuric acid content was evaluated. In this case, the removal efficiency was in a range of 70 to 80%.

Keywords: Biodegradation; atrazine; terbutryne; biofilm reactor.

Biodegradation of fluoroquinolones by a bacterial consortium

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The present concern in pharmaceuticals in the environment is well known and research studies in this area have been regularly reported. Pharmaceuticals reach the environment by several ways but mostly due to their incorrect disposal and the incomplete elimination during the treatment processes in Wastewater Treatment Plants (WWTP). These residues continuously enter aquatic environments and many of them are resistant to degradation, being so called as pseudo-persistent pollutants. In aquatic compartments, pharmaceutical residues reach concentrations in the ng L⁻¹ to µg L⁻¹ range.

This work describes the biodegradation of four fluoroquinolones, Ofloxacin (OFL), Norfloxacin (NOR), Ciprofloxacin (CPF) and Moxifloxacin (MOX), by a bacterial consortium constituted by three bacterial species isolated in our labs, namely F11, FP1 and S2, known to degrade different aromatic fluorinated compounds. The experiments were conducted in batch mode using a mineral medium supplemented with acetate and 10 mg l⁻¹ of each compound or 10 mg l⁻¹ of a mix of the compounds. The bacterial consortium was capable of aerobic biodegradation of OFL, NOR and CPF during successive feedings of the compounds to the medium, as measured by monitoring removal of the compounds by HPLC-FD and fluoride release by potentiometry. Degradation profile of the fluoroquinolones used in this study indicated that intermediate metabolites were accumulated. Two of the initial constituting strains, F11, belonging to the α-proteobacteria group, and S2, belonging to the Actinobacteria group, were recovered from the medium, F11 predominating in cultures fed with moxifloxacin whereas S2 was mostly found in the remaining cultures. Degradation by single bacteria is under evaluation.

Keywords Biodegradation; Pharmaceuticals; Fluoroquinolones

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