Biological diversity present in footwear industry biological wastewater treatment tanks: An analysis from the metagenomic viewpoint

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One of the biggest problems faced when studying leather biodegradation using a prototype developed by INESCOP based on infrared CO₂ detection lies in obtaining an inoculum containing the same microorganisms for all the tests. Since the experiments were carried out with inoculum samples from tannery wastewater, it was very important to understand the variability of their microbial composition. This study offers the opportunity to know the main microorganisms present in a tannery wastewater system, which will help find out which of the present species are involved in the biodegradation of leather and establish the ideal composition of the inoculum. Therefore, a study of the microbial diversity was carried out through the RNAr gene analysis in water samples from two biological tanks filled with tannery wastewater, as well as from a municipal wastewater tank. Samples were evaluated by PCR analysis of the RNAr gene amplified directly from the samples, followed by denaturing gradient gel electrophoresis (DGGE). The results showed that the microbial diversity was significantly high in tannery wastewater samples, each one having around 40 phylotypes. Interestingly, an active part of the degrading community was composed of protozoa and fungi, probably synergistically collaborating with prokaryotes in the biodegradation. For eukaryotes, DGGE indicated a lower diversity than for bacteria, this group being basically composed of a mixed population of protozoa and non-cultivated fungi. For bacteria, a large number of DGGE bands (64%) corresponded to bacteria not phylogenetically related to known and characterised species, the most abundant in the tannery wastewater analysed being Bacteroidetes and Proteobacteria. The sequencing data indicated that the majority of microorganisms present in the samples that had been analysed were uncultured species that had not been previously described.

Biography

M I Maestre-Lopez completed her PhD degree in the field of cell biology at Miguel Hernandez University (Alicante, Spain). She has been working as a researcher in INESCOP (Footwear Technological Institute) since 2005, being part of the Biotechnology Department.

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