TITLE: EVALUATION OF MICROBIAL COMMUNITIES FROM A BIOAUGMENTED BIOLOGICAL TREATMENT OF PAPER RECYCLING MILL EFFLUENT

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One of the processes most used for dealing with domestic and industrial effluents is biological wastewater treatment. The efficiency of the process depends mainly on the bacterial community and its activity. The effluent of paper recycling mill industry presents high organic load, presence of toxic substances, strong staining and inhibition of microorganisms, that make difficult its treatment, being needed the development of efficient technologies. The use of molecular biology techniques for the identification of microorganisms can clarify the wastewater treatment processes involved and can indicate ways to their improvement. Thus, the present study aimed the evaluation of the microbial community from biological treatments of paper recycling mill effluent, bioaugmented with a biological additive from bovine manure fermented. The paper recycling mill effluent was treated in four reactors: two reactors with the application of 5% of biological additive (component E), at anaerobic and aerobic condition; and two control reactors, without the additive. The working volume of reactors was 6 L, operated in batches: the aerobic reactors had a cycle of 6 h of aeration and 2 h of sedimentation, while the anaerobic reactors had a cycle of 24 h. Samples from all reactors were collected, and a 16S rRNA sequencing was carried out on an Illumina platform. The main phyla found in the samples with component E were the Bacteroidetes (29-35.6%), Proteobacteria (16.2-18.7%), and Chloroflexi (11.7-12.3%). Members of the Bacteroidetes and Chloroflexi phyla had been described as fermenters of recalcitrant compounds, including cellulose. The bioaugmentation of inoculum with component E resulted in a greater presence of *Anaerolinea* genus (4.5-6.1%) and an uncultured bacterium affiliated to the class Bacteroidetes vadinHA17 (12.3-16.1%) in both conditions. Members of Anaerolinea genus are strictly anaerobic, related to the fermentation of recalcitrant compounds (including cellulose) of which can produce hydrogen. VadinHA17 is known as an anaerobic/facultative bacteria which also could degrade complex compounds. The presence of these genera, even in aerobic condition, indicated the existence of anaerobic niches in reactor R3. Additionally, at the anaerobic condition, it was observed a remarkable presence of genus Sulfurospirillum (4.6%), which can use hydrogen as electron donor. Probably, the metabolism of Anaerolinea genus provided the substrate (hydrogen) for the Sulfurospirillum.

Keywords: bioaugmentation; biological treatment; recycled paper mill effluent; microbial characterization; molecular biology; molecular techniques; bacterial communities.