Analysis of the Bioremediation Potential of the Microbial Communities Isolated from Termites "Nasutitermes genus" and Ruminants "Capra aegagrus hircus", in Selective Media and Bioassays of Carboxymethylcellulose (CMC) with BETA-D-Glucose, Phase II

Gonzalez Del Toro, Jovangelis (School: Superior Vocacional Benjamin Harrison)

The purpose of this research was to analyze the bioremediation potential of microbial communities isolated from termites: Nasutitermes genus and Ruminants: Capra aegagrus hircus, as an alternative to accelerated paper degradation. In Phase I, microorganisms from termite guts were isolated and characterized to evaluate their cellulolytic potential. The metagenomic DNA was analyzed to determine the composition of its microbiome. Using bioinformatics, five cellulolytic microorganisms were identified, including the bacteria: Gryllotalpicola and Candidatus Carsonella, which turned out to be novel candidates. In Phase II, microbial communities isolated from termites were analyzed with microbial communities isolated from Goat feces. Termites and ruminant's microbiome samples were inoculated in bioassays with Carboxymethylcellulose + BETA-D-glucose and selective media with paperless Carboxymethylcellulose. Bioassays were inoculated with 0 microliters, 100 microliters, 150 microliters, and 200 microliters of the samples. The selective media were inoculated with 100microliters and 200microliters of the samples. They were incubated at 30°C, performing a qualitative review of microbial growth, media degradation and paper degradation every 48 hours for five days. These were subjected to Iodine Solution Test to identify enzymatic activity. A quantitative review of degradation percentage was performed. Bioassays inoculated with 150 microliters and 200 microliters of termite microbial communities degraded 78% and 86% of the medium respectively, presenting more accelerated paper degradation compared to ruminant microorganisms. In conclusion, cellulolytic microorganisms isolated from termites serve as a cost-effective, accelerated and sustainable bioremediation mechanisms to reduce the environmental impact generated by the accumulation of paper waste worldwide.