Evaluation of PAHs Degradation by a Fungal Consortium Using Different Agroindustrial Waste as Texturizer for Bioremediation Soils

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Background/Objectives. The development of the oil industry in Mexico has caused irreversible environmental damage, PAHs are compounds present in crude oil and its derivatives. These, due to their physicochemical characteristics, are persistent compounds in the environment, causing damage to the soil and human health. The objective of this work was to evaluate the effect of different agroindustrial waste as texturizer for the contaminated soil on the degradation of phenanthrene (Phe) and pyrene (Py) by a filamentous fungal consortium at the microcosm level.

Approach/Activities. This project was developed on a laboratory scale in microcosm assays performed on 50 ml serological bottles. These vials contained, sterile soil contaminated with 3000 ppm of Phe and Py (1:1), the agroindustrial waste (peanut peel, corn cob, corn stover and *Typha latifolia* stover) one per treatment and previously inoculated with a filamentous fungal consortium at a concentration of $1x10^6$spores/ml and culture medium to adjust humidity to 30% and incubated at 30ºC for 12 d. Each 24 h, we sacrifice experimental units of each treatment to determine the removal of the PAHs mixture by gas chromatography (GC) and we measure the CO_2 production as an indirect measure of the growth of the consortium.

Results/Lessons Learned. The data obtained by GC indicate that the agroindustrial waste promotes the degradation of PAHs by the filamentous fungal consortium was the maize stover with 68.7%, followed by the *Typha latifolia* residue with 61.4% degradation. The data obtained were analyzed by ANOVA ($P < 0.05$) indicating that the differences between the means of the residues were statistically different, these results show that the composition of the agroindustrial waste can have an effect on the degradation of the PAHs, because the agroindustrial residues can stimulate the production of different extracellular enzymes necessary according to their composition for their assimilation as a carbon source. The accumulated CO_2 production remained in a range of 11.9 to 10.5 mg of CO_2/g soil in treatments with PAHs. The ANOVA analysis ($P < 0.05$) suggests that there was no significant difference indicating that the four agroindustrial wastes favored the growth of the fungal consortium. This study showed the importance of using agroindustrial wastes in degradation of PAHs by fungal consortiums for the bioremediation of contaminated soils. The use of fungal consortia for the bioremediation of soils contaminated with PAHs is a viable alternative because high rates of degradation of these toxic compounds are obtained.