EFFECT OF THE ADDITION OF DIFFERENT AGROINDUSTRIAL WASTE ON MICROBIAL GROWTH FOR DDT DEGRADATION IN AGRICULTURAL SOIL

María Lilia Calva, Cecilia Téllez, Noé Sánchez y Diana V. Cortés-Espinosa, Instituto Politécnico Nacional, Centro de Investigación en Biotecnología Aplicada. Carretera Estatal Tecuexcomac-Tepetitla Km 1.5, Tlaxcala, México. C.P. 90700, tel. 5557296000 Ext. 87805; dcortes@ipn.mx

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Introduction. The use of DDT in Mexico is found limited, however despite of its high persistence (10 years higher), there are still problems of soils pollution. Some microorganisms adapted to contaminated soil with plaguicides, have the capacity to degrade this type of compounds such as DDT. Biostimulation is a technique used for bioremediation of soils and consists on stimulating the native microbiota by the optimization of culture conditions such as moisture, aeration and nutrient addition that promote microbial activity, it is considered a technique efficient and economical to decrease its levels in the environment(1). Agroindustrial waste are used in this processes, because they are biodegradables, provide nutrients, they are a support of the growth of microorganisms and serve as a texturizer for soil aeration.

The aim of this study was to evaluate the effect of the application of 3 different agroindustrial wastes on the microbiota biostimulation of an agricultural soil contaminated with DDT at microcosm.

Methods. The agricultural soil was characterized physicochemically. The microbial activity was studied during 20 days in microcosms, that contains 14 g of dry base matter (polluted soil artificially with 50 ppm of DDT plus agroindustrial waste to a ratio 95:5), with humidity of 30%, the experiments were established as these: T1 y T2: sterile soil with or without DDT; T3 y T4: soil no sterile with or without DDT; T5: soil with cane bagasse; T6: soil with wheat straw y T7: soil with corn stover. As an indirect measure of the metabolic activity of microorganisms each 48 h the CO_2 production was measured through the technic of degree acid- base. The count of bacteria and fungi was done by the technic of plate dilution. Degradation of DDT was determinated by GC.

Results. The soil presents a percentage of 2.4, 0.12 y 0.002 of organic, nitrogen and phosphorus respectively, a sandy loam texture and a pH of 7.23. The treatment T3 shows the metabolic activity lower (effect of the addition of DDT), while the T7 shown the higher activity (positive effect of the nutrients from corn stover to the microbiota of the soil). T5 y T6 presented the higher activity in the 8th and 10th d, respectively (Figure 1). The total CFU both bacteria and fungi along kinetics (figure 2) confirm that the addition of DDT to the soil inhibits bacterial growth (T3), while the treatment added with agroindustrial waste shown a higher growth at the eighth day.

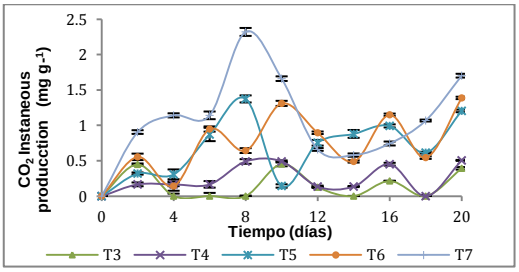

Figure 1. *Instantaneous CO_2 production in the microcosm*

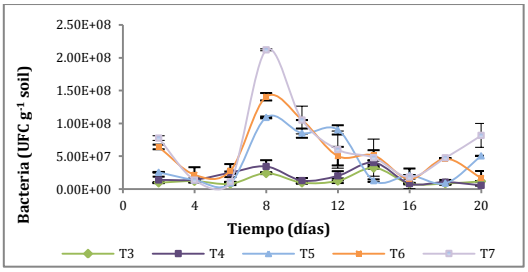

Figure 2. *CFU of bacteria in microcosm.*

Conclusions. The addition of corn stover generated a metabolic activity higher than the sugarcane bagasse addition and wheat stover, so that represent a good alternative for the bioremediation of soils that present a sandy loam texture, because it provides nutriments to biostimulate the growth of native microorganisms can be associated to the DDT removal.

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References. 1. Alexander M. (1981). Biodegradation of chemicals of environmental concern. *Science* 211: 132-138.

2. Kantachote D. Naidu R. Singleton I. McClure N. Harch B.D. 2001. *Applied Soil Ecology*. 16: 85-90.