TITLE: ***Degradation of Diuron in Bioaugmented Soil by Rhizosphere Microrganisms Isolated from Sugarcane.***

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ABSTRACT

The diuron, N-(3,4-dichlorophenyl)-N, N-dimethylurea is one of urea replaced herbicide widely used in the cultivation of sugar cane in composition with other substances such as hexazinona. The microbial route is considered the main form of transformation and 3 -(3,4-dichlorophenyl)-3-metilureia (DCPMU), 3.4-diclorofenilureia (DCPU) and 3,4-Dichloroaniline (DCA) are considered main products of this degradation. This study aimed to verify the microbial degradation of diuron in a bioaugmented soil with microorganisms of sugarcane rhizosphere. The microorganisms were selected in an area with historical application of herbicide, went through a process of isolation of a solution of Hexarom WG® as a source of nutrients and were characterized as Gram stain, morphology, biochemical reactions and formation of spores. The microorganisms were used in another study of growth in solutions of different compositions, one of which has diuron as the sole source of nutrition. The soil employed in the study was caracterízated by CTC, texture and moisture variables, total organic carbon content, pH, counting of aerobic mesophilic bacteria and fungi. Concentration of diuron, DCMPU, DCPU and DCA were determined by high performance liquid chromatography (HPLC). The study area was subdivided into lots, being lot A bioaugmented, lot B bioaugmented and enriched with diuron, lot C enriched with diuron and lot D control. The methodology of analysis of diuron and metabolites, has been optimized and validated, according to the repeatability, linearity and reproducibility, for the concentration levels 25, 50, 100, 200, 500 and 1000 mg. L-1. The process of isolation for 5 weeks has shown a decrease in microbial population when using the herbicide only as a source of nutrient. In the study of growth in solutions of different compositions can observe that the results in the presence of diuron the microbial population was higher than that observed in other solutions, which may be evidence of the adaptation of microorganisms selected from the study area for the diuron. The classification textutral soil was defined as sandy soil. Of the parameters monitored, only the concentration of diuron showed significant differences between the lots and the depths. The metabolites DCPMU, DCPU and DCA were below the limits of quantification of the method. The processing of data through multivariate analysis has pointed out that

the bacterial population influenced the deterioration of diuron and that the herbicide had positive correlations with the most superficial of the study area, and with the levels of total organic carbon, assuming that this is the favorite adsorption site of the herbicide. The negative correlations between the level of aerobic mesophilic bacteria and concentration of diuron evidenced that the process has occurred through catabolic relationship.

Keywords: Diuron. Degradation. Metabolite. Sugarcane. Rhizosphere Soil. High Performance Liquid Chromatography.