TITLE: TOLERANCE TO DICAMBA AND HEAT HERBICIDES BY WATER AND BIOFILM BACTERIA.

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ABSTRACT:

Herbicides are used to improve the agricultural productivity. However, the use of these toxic components can modify the structure of soil and water microbiota, resulting in environmental impact. Bioremediation is an alternative decontamination process for toxic components, which can be transformed into harmless molecules using microorganisms' metabolic activity. Thus, the objective of this study was to evaluate the ability to tolerate high doses of herbicides by biofilm and planktonic bacterial strains, and therefore their potential use for bioremediation of contaminated water. The bacterial strains were isolated in water storage tanks used for washing of herbicide containers, located at Capão da Onça Farm School, UEPG, Ponta Grossa, Paraná. The stored water was used to wash about thirty different blends of herbicides. Two herbicides were used as selective agents for tolerance experiments: Dicamba, used for weed control in maize, sorghum, pasture and grassland cultivation; and Heat, used for the control of most dicotyledonous weeds in cotton, rice, potato, bean, corn, soy, among other crops. After serial dilution, eighty-eight bacterial isolates were stored in the Microorganisms Collection of the UEPG Environmental Microbiology Laboratory, maintained in glycerol at -20ºC. These isolates were tested for bacterial tolerance in microplates containing Luria Broth and Mineral Medium, with and without glucose, using different concentrations of herbicides (1x, 10x and 40x), calculated from the doses corresponding to the field rates according to label directions. The results showed that twenty-six biofilm and one planktonic isolates were Heat tolerant; and twenty biofilm and four planktonic isolates were Dicamba tolerant. The higher number of biofilm tolerant isolates than planktonic ones is possibly due to a more intense *quorum sensing* found out in biofilm construction and, therefore, a set of more integrated and adaptive responses to a toxic environment. Five of the most tolerant strains are being identified by 16S ribosomal gene sequencing, and being evaluated for herbicide degradation by HPLC analysis. After that, degrading strains could be eventually used in bioremediation programs.

Keywords: bioremediation, herbicide toxicity, bacterial communities, herbicide tolerance.

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