

TITLE: GLYPHOSATE-ANTIBIOTIC CROSS-RESISTANCE OBSERVED IN SOIL GRAM-NEGATIVE BACTERIA FROM DIFFERENT AGRICULTURAL MANAGEMENT SYSTEMS IN EUSEBIO, CEARÁ, BRAZIL

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ABSTRACT:

Brazil is the fifth in the world ranking of pesticides consuming countries and glyphosate (GLY) figures among the most commercialized, despite banned by several nations. The indiscriminate use of agrottoxics has brought unprecedented consequences to the environment and human health. Recent studies showed microorganisms exposed to pesticides suffer selective pressure by developing resistance to those compounds concomitantly to some antibiotics (AB) in a phenomenon known as "cross-resistance" (CR), aggravating even more the growing multiresistance of bacteria to AB. The present study aimed to evaluate the occurrence of GLY/AB CR in soil bacteria from different forms of agricultural management in Eusébio municipality, Ceará State. An extraction solution supplemented with 3% GLY followed by culture in MacConkey agar was employed to selectively isolate Gram-negative bacteria from agroforestry (S1), conventional scouring (S2) and uncultivated (S3) soils. Disc diffusion tests assessed bacteria resistance to ampicillin (AMP), ciprofloxacin, chloramphenicol, ertapenem (ERT), erythromycin, gentamicin, streptomycin, and tetracycline. Overall, 58 strains were isolated. Remarkably, soils S1 and S2 presented almost equal number of multidrug resistant (MDR) strains, the majority resistant to AMP. That may be due to the regional agricultural practices, which employ manure from poultry intensive farms where antibiotics are used as feed additives to improve animal performance. Although there were a few percentage of strains resistant to ERT (33% from S1), the fact they were found is of concern. Carbapenem antibiotics are used to treat clinical cases of MDR bacteria, which are not common out of hospital settings. MALDI-TOF mass spectrometry identified *Stenotrophomonas maltophilia* (from S2), resistant to six out of all antibiotics tested. The result of this study is grim: bacteria cross-resistance spread out by unselective use of both antibiotics and agrottoxics.

Keywords: multidrug resistance, selective pressure, *Stenotrophomonas*

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