TITLE: DIURON AND ATRAZINE CHANGE THE ANTIMICROBIAL RESISTANCE PROFILE OF ENVIRONMENTAL ISOLATES OF *Pseudomonas aeruginosa*

AUTHORS: BRAZ, V.S.; MORETTO, J.A.S.; FERNANDES, A.F.T.; STEHLING, E.G.

INSTITUTION: FACULDADE DE CIÊNCIAS FARMACÊUTICAS DE RIBEIRÃO PRETO, UNIVERSIDADE DE SÃO PAULO (AV. DO CAFÉ S/N. BLOCO S, SALA 12, MONTE ALEGRE, 14040-903 RIBEIRÃO PRETO, SP, BRAZIL. E-MAIL: vabraz@usp.br)

ABSTRACT:

Pseudomonas aeruginosa is a versatile bacterium that thrives in a wide range of environments due to its ability to assimilate a large variety of organic compounds as carbon and nitrogen source. It is a Gram-negative bacterium and opportunistic pathogen, which shows high resistance to several antibiotics. The environment is a major reservoir of antimicrobial molecules produced by microorganisms and, in addition, there are a large number of xenobiotics, molecules usually introduced into the environment by human action through agricultural pesticides, plastics, cleaning products and drugs. This study aimed to investigate if exposure to two herbicides very used in Brazil, atrazine and diuron, could induce changes in the susceptibility profile to the antibiotics aztreonam, polymyxin and colistin. For this, were selected four isolates of *P. aeruginosa* (S107, S109, S129 and S132) previously isolated from Brazilian agricultural soils and sensitive to aztreonam (MIC ≤ 16 μg mL^{-1}). These isolates were cultivated for 7 days (first stimulus) in two different minimal culture media, ATZ-R broth, and DIURON broth, containing atrazine and diuron respectively. Then, an aliquot was spread onto ATZ-R agar and DIURON agar and the plates incubated for 48 hours. All isolates were able to use atrazine as the only nitrogen source and diuron as a carbon source. This process was repeated four times, totaling 28 days of stimulation with herbicides (atrazine and diuron). After the fourth stimulus, the four isolates were analyzed by disc diffusion method on Muller-Hinton agar containing atrazine or diuron and some changes in the susceptibility profile for colistin and polymyxin were detected. Minimum Inhibitory Concentration method (MIC) was performed for aztreonam, colistin, and polymyxin. The results showed that isolates S107, S109, and S129 had a decrease of susceptibility only to aztreonam after the stimuli with both herbicides. On the other hand, the increase of resistance to colistin and polymyxin only occurred in the presence of diuron onto the plate. In this way, it is possible to suggest that excessive use of herbicides, in addition to the risk of pollution, can increase the resistance potential for environmental bacteria, in special for aztreonam, colistin, and polymyxin, which normally are the last option for the treatment of infections caused by *Pseudomonas*.

Keywords: *Pseudomonas aeruginosa*, Soil, Atrazine, Diuron, Antimicrobial resistance profile

Development Agency: CAPES and FAPESP