



ASSESSING MIXTURE TOXICITY OF HERBICIDES USING ZEBRAFISH (*DANIO RERIO*) EARLY-LIFE STAGES

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Herbicides are the most common pesticide used in agriculture, but the impact of this practice on non-target organisms isn't well known. In the environment these compounds are rarely alone, but almost no information is available about the combined toxicity of herbicides. The aim of this work was to evaluate the effects of the mixture of ametryn and tebuthiuron, two herbicides widely used in sugarcane cultivation, the predominant crop of the state of São Paulo, Brazil. The toxicity of the mixture was evaluated using the Fish eleutheroembryo toxicity (FEET) test, with *Danio rerio*, a tropical cyprinid used in ecotoxicological research. The endpoints monitored included pigmentation, otolith formation, yolk absorption, pericardial oedema, tail deformation, hatching, coagulation and death. Five concentrations of ametryn (ranging from 19.44 to 72.91 mg L⁻¹) and tebuthiuron (ranging from 0.13 to 0.47 g L⁻¹) were tested. Statistical analysis was performed with ToxCalc spreadsheet built over Microsoft Excel. Independent Action and Concentration Addition models were used to fit the data. Binary mixture data was used to identify possible deviations from each model and the best fit was selected based on statistical comparisons between outputs. Ametryn is most toxic than tebuthiuron, presenting a LC_{50-96 h} of 52.94 (± 5.70) mg L⁻¹ and 413 (± 60) mg L⁻¹, respectively. Ametryn and tebuthiuron show antagonism when used as binary mixture and the model that best describes this mixture is the Independent Action. The endpoints evaluated on this work were useful to understand the mode of action of the binary mixture and reinforce the importance of monitoring sublethal parameters to assess the real risk of agrochemicals found on aquatic ecosystems.

Keywords: Fish eleutheroembryo toxicity test, mixture toxicity, ametryn and tebuthiuron

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