

STUDY ON THE JOINT ACTION OF HERBICIDES TEBUTHIURON, DIURON AND HEXAZINONE TO TILAPIA (*Oreochromis niloticus*) FINGERLINGS

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Tilapias are endemic to Africa but due to its high aquaculture potential spread world widely. *Oreochromis niloticus* is the main specie cultivated and caught in São Paulo State, Brazil, where the predominant culture is the sugarcane. The high productivity of this crop demands the intensive use of equipment and pesticides, which can contaminate water bodies adjacent to the cultivation areas. The herbicide mixture in the spray tank is a common practice among farmers, although it is prohibited by law. Possible interactions between different herbicides used simultaneously are not understood and the impact of this practice on non-target organisms is not well known. In this work we evaluated the acute toxicity (96 hours) of the mixture of herbicides tebuthiuron (concentrated suspension containing 50% active ingredient), and a commercial mixture compounded by herbicides diuron and hexazinone (concentrated suspension containing 46.8% a.i. of diuron, 13.2% a.i. of hexazinone and 40% of not specified ingredients) to *O. niloticus*. Five concentrations of the mixture were tested [0 (control), 22, 40, 74, 132 and 240 mg L⁻¹] in duplicate. Fish (Ls = 4.72 ± 0.81 cm Wt = 3.67 ± 1.61 g) (n = 60) were stocked in 10L aquarium with forced aeration, maintaining a density approximately 2 g of fish L⁻¹. The experimental units were kept in a room with controlled photoperiod (16:8 h light: dark) and temperature (26 ± 2 ° C). The endpoints monitored included abnormal behavior and lethality. Statistical analysis was performed with Statgraphics Plus 5.1. The mixture diuron+hexazinone is more toxic than tebuthiuron, presenting a LC_{50-96h} of 18.62 (14.79 – 24.45) mg L⁻¹ and 223.04 (199 - 250) mg L⁻¹, respectively. When fish were exposed to the mixture of these herbicides, a LC_{50-96h} was determined in 43.10 (33.84 – 56.71) mg L⁻¹, showing a very lightly antagonism (Additive Index = -0,245). Fish exposed to concentration of 22 mg L⁻¹ exhibited loss of equilibrium and over 40 mg L⁻¹, paralysis. The endpoints evaluated in this study allowed a better understanding of the mode of action and toxicity of the mixture diuron+hexazinone and tebuthiuron to *O. niloticus*. Even at sublethal concentrations, these pesticides may lead to a population declines because individuals are more susceptible to predation and do not exhibit normal behavior, thus cannot be recognized by others of the same species. Since it is almost impossible to found these pesticides isolated in nature, risk assessments that use data from the single substances are underestimating their real risk. Data are also important to design long-term exposure studies.

Keywords: mixture, acute toxicity, sugarcane