

# Assessment of the Potential Toxic Effects of an Insecticide Non-Selective (ALPHYTHRINE) on *Daphnia magna*

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## ABSTRACT

The present work aims to evaluate the potential acute toxicity of a non-selective organochlorine insecticide, Alphythrine on a freshwater water cladoceran, *Daphnia magna*. The insecticide, the active ingredient of which is deltamethrin, is made in Algeria and widely used by farmers. For the performance of our assessment, we proceeded to expose daphnids to a range of increasing concentrations of deltamethrin. The concentrations tested are: 75, 80, 85, 90 and 95 µg/l.

The results obtained show that the mean lethal concentrations (LC50), calculated by the Probit analysis, are of the order of: 1.90 and 1.95 µg.L<sup>-1</sup> after 24 and 48 hours respectively.

In addition, the antioxidant assay revealed oxidative stress which resulted in a drop in glutathione (GSH) and increased glutathione-S-transferase (GST) and catalase (CAT) activities. Our results show that deltamethrin is an insecticide toxic to *Daphnia magna*.

**Keywords:** *Daphnia magna*; Alphythrine; Oxidative stress; Mortality; Antioxidants.

## INTRODUCTION

The intensive use of pesticides has increased dramatically over the last decades and consequently leads to the contamination of various compartments of the environment. Thus, pesticides have become the most common organic pollutants in natural waters [1].

This continued contamination of aquatic environments has triggered the need to identify new models and bioassays for the assessment of water pollution [2, 3].

It is in this context that we carried out an eco-toxicological study consisting in determining the physiological, biochemical and enzymatic modifications observed in a biological model of freshwater: *Daphnia magna* subjected to treatment with an insecticide widely used in Algeria.

## OBJECTIVES

The purpose of this work is to assess the potential acute toxicity of a non-selective organochlorine insecticide, Alphythrine, on a freshwater water cladocerus, *Daphnia magna*. The insecticide whose active ingredient is deltamethrin.

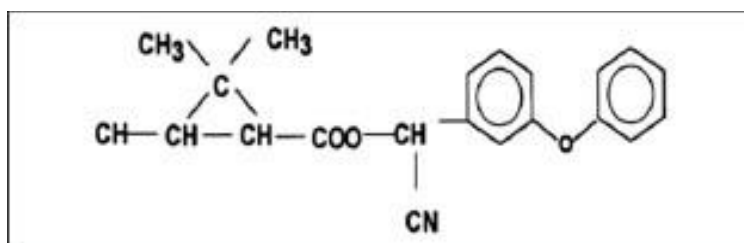
## METHODOLOGY

*Daphnia* (Figure 1) come from a continuous culture in our laboratory, they are cultivated at constant temperature and photoperiod [4-7] for treatment, after performing a series of preliminary tests with different concentration ranges, five neonates are placed in test tubes containing 10 ml of medium For treatment, after carrying out a series of preliminary tests with different concentration ranges, five neonates are placed in test tubes containing 10 ml of medium and the desired concentration of (Alphythrine) ISO (ISO/DIS 6341.2).

The insecticide alphythrine, the active ingredient of which is deltamethrines (Figure 2), is manufactured in Algeria, was the subject of this work.



**Figure 1.** *Daphnia magna*.



**Figure 2.** Chemical structure of deltamethrin.

## CONCLUSION AND RESULTS

The results obtained that alphythrine caused a dose-dependent inhibition after 24 and 48 hours of exposure in the treated by the increasing concentrations. Metabolically, Alphythrine caused a dose-dependent increase in the level of total protein. In addition, the monitoring of oxidative stress biomarkers showed a significant depletion of the level of glutathione (GSH) accompanied by a sharp increase in the activities of glutathione S-transferase (GST) and catalase (CAT) reflecting the toxic effects of this insecticide on *Daphnia magna* cells.

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