Biocatalysis Synthesis of New Herbicide Derivative: Evaluation of Toxicity in *Drosophila Melanogaster*

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Abstract:

Our research was performed to synthesis a novel herbicide derivative from auxinic family, the N-(4-chlorophenyl)-2-phenoxypropanamide using an eco-friendly process of green chemistry the biocatalysis who respect environmental requirements.

For this purpose, a novel herbicide derivative, the N-(4-chlorophenyl)-2-phenoxypropanamide was synthesized from the 2-phenoxypropanoic acid herbicide. The product was obtained by direct coupling of carboxylic acid and a primary aromatic amine using an enzymatic biocatalyst. Furthermore, we compared the yield of two lipases belonging to the family of serine hydrolases *Candida antarctica A (CAL-A)* and *Candida antarctica B (CAL-B)* with quantities ranging from 12 to 100 mg. The results obtained show that *CAL-B* present better yield (80%) with 50 mg amount than *CAL-A (30%)*. We also compared three solvents of different polarity and structures to assess the hydrophobicity, toluene, heptane and 2-methyl-2-butanol. The data revealed that heptane presents the best isolated chemical yield in amide produced with 80%.

The toxic effect of this synthesized amide was evaluated on the fecundity, development and locomotion

of a non-target species *Drosophila melanogaster*, selected as a biological model. The results showed no effect on the reproductive power of this species, in fact no effect on fertility was recorded. However, this herbicide affects development by reducing the number of larvae, nymphs and adults from eggs spawn, and by reducing the locomotion of male and female adults of this species. The toxicological data obtained classifies this herbicidal derivative as not very toxic and eco-friendly herbicide.

Keywords:

Herbicide, Green Chemistry, Biocatalysis, Toxicity, Drosophila melanogaster.