

POTENTIAL TOXICITY OF BIGNAI EXTRACT IN MEDIAN LETHAL
CONCENTRATION (LC50) USING PROBIT ANALYSIS

THESIS

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ABSTRACT

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The study “Potential Toxicity of *Bignai* Extract in Median Lethal Concentration (LC₅₀) using Probit Analysis” was conducted at Cavite State University – Don Severino Dela Alas Campus, Indang, Cavite. Generally, the study provided a model that describes the concentration-response relationship of the lethal activity of *Bignai* extract using probit analysis. Specifically, it aimed to: (1) construct a probit model that would predict probability of subject receptors’ lethality given a concentration; (2) test the goodness-of-fit of the estimates and measure the adequacy of the constructed probit model; (3) establish the potential toxicity of *Bignai* extract in terms of median lethal concentration (LC₅₀); and (4) categorize the toxicity level of *Bignai* extract in LC₅₀.

Probit analysis is a statistical tool that is commonly used to determine the relative toxicity of substances. In the study, the method was run by the maximum likelihood estimation using Newton-Raphson Algorithm.

Through probit analysis, the developed probit regression model is given by:

$$y = -3.721 + 3.725x$$

Model validity was tested through the following: goodness of fit test using Pearson’s method, model adequacy measure using McFadden’s, Cox & Snell’s, and

Nagelkerke's formulae, and deviance statistics test. All tests revealed satisfactory results regarding the significance and correctness of the constructed model.

Thus LC_{50} of *Bignai* leaf extract computed using the probit regression model is established at 9.975 $\mu\text{g/ml}$ with 95% fiducial limits from 8.871 $\mu\text{g/ml}$ to 11.830 $\mu\text{g/ml}$.

Using the Clarkson's toxicity criterion for the toxicity assessment of plant extracts, *Bignai* extract is classified as highly toxic.

In general, results of the LC_{50} of *Bignai* provided a pharmacological basis for cytotoxicity, anti-cancer property, and insecticidal potential of the plant which warrants further investigation.

Using the derived model, this study moreover provides relative information on the concentration-response relationship, which are the lethal probabilities given different concentrations of *Bignai* extract.

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INTRODUCTION

Through the ages, plant extracts have undoubted glorious history as medicinal agents and as other alternative means of various human needs because of their valuable bioactive substances. Subsequently, there is a current shift of interest in these extracts regarding their toxicological properties. Recent studies indicate that some plants used as food sources have mutagenic or genotoxic potential (Tulay & Ozlem, 2007). Then, numerous studies focused on both pharmacology and toxicity of herbals used by humans. Thus, toxicity testing is now paramounting in the screening of newly developed plant products before it can be used.

Plants are generally regarded as safe throughout the world because of the word “natural” implanted unto them. But similarly, both lifesaving items such as water and oxygen can kill in excessive or inappropriate amounts, so the quantity is often an important consideration (Boullata and Nacen 2000; Ernst, 2007). In congruence to this,