

**Impact of Pesticide Exposure on Succession Patterns and Developmental Rates of Forensically Important Carrion Insects in Tropical Regions: Implications for Postmortem Interval Estimation**

**PhD Research Proposal**

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**Area Of Research: Forensic Entomotoxicology**

## **Abstract**

Determining the postmortem interval (PMI) is an essential aspect in any forensic investigations by analysing the succession pattern of forensically important carrion insects. Environment pollutants like pesticides are used as a poison for committing suicide as it is commonly used in agriculture in tropical regions. The pesticides can impact the insect growth rate, behaviour and also the succession pattern possibly affecting the PMI estimation. The aim of this study is to understand how pesticide exposure affects the succession pattern of insects as well as their developmental rate of forensically important insects in tropical environments. Field studies will be conducted in tropical outdoor settings using animal remains treated with common pesticides along with control group. Insects development rate, growth, arrival order and colonization order will be clearly monitored and recorded. Forensic important insects like blowflies will be collected and identified using established entomological methods. Comparative analysis will be done between the pesticide treated samples and the control samples to assess the differences. Simultaneously laboratory rearing of these insect species will be done under regulated pesticide levels to observe the effects on growth rate, developmental delays etc. The expected result will help in understanding how pesticides impact insect behaviour in decomposition process. This study aims to provide insights into the accuracy of forensic entomology in real case scenarios in tropical environment where chemical exposure is becoming more significant.

## **Research Objectives**

1. To study the succession patterns of forensically important carrion insects on pesticide-exposed and unexposed animal remains under tropical conditions.
2. To evaluate the developmental rates of key forensic insect species (e.g., blowflies) when exposed to different concentrations of commonly used pesticides.
3. To compare insect diversity, arrival time, colonization sequence, and life cycle progression between pesticide-treated and untreated carcasses.
4. To determine how pesticide-altered insect development influences the accuracy of postmortem interval (PMI) estimation models.

## **Methodology**

Field studies will utilize pig carcasses (both treated and untreated) placed in tropical environments to observe patterns of insect colonization and succession. Insects will be gathered, identified, and analysed on a daily basis. Concurrently, laboratory-based rearing of chosen species (such as blow flies) will occur under different pesticide concentrations to monitor developmental timelines and mortality rates. Statistical methods (including ANOVA, regression, and survival analysis) will be employed to assess differences and make adjustments to PMI models as needed.

**Expected Outcome:**

1. Detailed database of succession patterns and developmental rates of key tropical carrion insects under pesticide exposure.
2. Validated methods for detecting pesticides in forensic insect samples.
3. Improved, region-specific PMI estimation models accounting for pesticide effects.