



De La Salle University – Dasmariñas
GRADUATE PROGRAM

**GEOGRAPHIC MAPPING OF LEAD DEPOSITION ALONG
AGUINALDO HIGHWAY, CAVITE USING MOSSES
AS BRYOMETER FOR AIR POLLUTION**

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Master of Science in Biology

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ABSTRACT

Name of Institution: De La Salle University-Dasmarinas
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Title: **Geographic Mapping of Lead Deposition Along
Aguinaldo Highway, Cavite Using Mosses
as Bryometer For Air Pollution**
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STATEMENT OF THE PROBLEM:

The study was aimed at identifying the geographical pattern of the deposition of lead (Pb), a heavy metal, along Aguinaldo Highway using common mosses as bryometer for air pollution. Specifically it aimed to answer the following questions:

1. What species of mosses are found along Aguinaldo Highway using three geographic locations, namely:
 - 1.1 Upland (Tagaytay and Eastern Silang)
 - 1.2 Midland area (Western Silang and Dasmariñas)
 - 1.3 Lowland (Imus & Bacoor)



2. What are the levels of lead deposition on the common species of mosses collected from the three geographic locations?

3. Is there a significant difference on the levels of lead deposition on the different species of mosses collected from each geographic location?

4. Is there a significant difference on the levels of lead deposition among the common species of mosses collected from the three geographic locations?

SCOPE AND COVERAGE:

The research was a descriptive-comparative type of study, which focused on geographic mapping of lead deposition along Aguinaldo Highway, Cavite. Common moss bryophytes belonging to class Bryopsida found on the three geographic locations were used to measure the level of lead. Collection was limited along the Aguinaldo Highway, stretching to Tagaytay, Silang, Dasmariñas, Imus, and Bacoor with a total distance of 44 kilometers. Collection was done based on Cavite's geographic structure with a total of three geographic locations. These include the Upland, which is located in Tagaytay and eastern Silang; Midland, which is located in the western portion of Silang and Dasmariñas; and the Lowland, which is located in Imus and Bacoor. Areas with the greatest traffic density along Aguinaldo Highway, were prioritized as the geographic locations.



Convenient sampling technique was employed to different microhabitats such as rocks, trees, and anthropogenic substrates. Collection of samples was done during the wet season, from July to August and the collected samples were identified up to species level.

The common species present on the three geographic locations were subjected for Pb analysis through Flame Atomic Absorption Spectrometry. This was done at Central Analytical Services Department, University of Philippines, Los Banos, Laguna.

METHODOLOGY:

The research was a descriptive-comparative type of study that focused on spatial geographic mapping of lead deposition along Aguinaldo Highway, Cavite extending from Tagaytay to Bacoor. The study used moss as bryometer of lead deposition using *in situ* method. Generally, the objective of the study was to geographically map the level of lead deposition on different species of mosses found along Aguinaldo Highway, Cavite. Specifically it aimed to taxonomically enumerate the different moss species found and to determine the levels of lead deposition on the common species collected along Aguinaldo Highway. The study also aimed to determine if there were significant differences on the level of lead deposition on the different species of mosses considering the three geographic locations. Significant difference on the level of Pb deposition among mosses was also determined. The



following hypotheses were tested in this study: there is no significant difference on the level of lead deposition on the different species of mosses collected from each geographic location; and, there is no significant difference on the level of lead deposition among the common species of mosses.

Collections were done during the wet season, on the last week of July and last week of August. Identified specimens were brought to the Botany Division of the Philippine National Museum for proper identification.

The lead metal analysis was done using Flame Atomic Absorption Spectrometer at Center Analytical Services Laboratory, National Institute of Molecular Biology Biotechnology Division, University of the Philippines, Los Banos, Laguna. Statistical analysis was done using one-way Analysis of Variance and Scheffe method at 5% probability level.

MAJOR FINDINGS:

One hundred thirty-one moss samples were collected along Aguinaldo Highway, Cavite. Out of these collected samples, 21 species of mosses were identified, five of which were found common to the three geographic locations.

There were 18 species of mosses belonging to 8 families and 16 genera, identified in Upland. Ten species of mosses belonging to 8 families and 9 genera were identified in Midland. In Lowland, 8 species belonging to 6 families and 8 genera were identified.



The five common moss species were subjected to lead analysis. The level of lead deposits on the common moss species collected on the different geographic locations along Aguinaldo Highway varied.

Statistical analysis shows that there was no significant difference on the level of lead among the species collected on the three geographic locations along the Aguinaldo Highway, Cavite, and that the null hypothesis of no significant difference on the level of lead among the species collected on the three geographic locations along the Aguinaldo Highway, Cavite was accepted. This means that the five common moss species could be used as bryometer to determine lead deposition along Aguinaldo Highway, Cavite.

However, statistical analysis among the three geographic locations shows that there was a significant difference on the level of lead deposit and that the null hypothesis of no significant difference on the level of lead on the three geographic locations along Aguinaldo Highway, Cavite was rejected.

Scheffe Method also shows that the mean difference between Upland and Lowland was significant. Likewise the mean difference between Midland and Lowland was significant. It appeared that there was no significant difference between Upland and Midland.

CONCLUSIONS:

There were 21 identified species of mosses out of 131 samples collected along Aguinaldo Highway using the three geographic locations, five



of which are found common along Aguinaldo Highway, Cavite. Upland had the greatest number of moss species. Lowland had the least number of moss species due to the transformation of the area into an urbanized and industrialized area (Peyra, 2002).

Among the common species found along Aguinaldo Highway, *S. grevilleana* Mitt. had the highest average lead deposit. It was followed by *S. latifolium* Bartram sp. nov., *R. spiniforme* (Hedw.) Bruch, *B. javanica* Doz. & Molk., and *E. rubicundus* (Wills.) Jaeg. had the least average lead deposit. The result shows that each of the common species had its own range and average level of lead deposition. However, statistical result shows that there was no significant mean difference on the level of lead deposit among the common species. This proves that these common species could be used as bryometer for lead deposition.

However, in spite of least number of moss species, in Lowland, it had the highest average lead deposit as compared to Upland and Midland. Statistical result shows that there was a significant difference on the level of lead deposit between Upland and Lowland, likewise in Midland and Lowland while no significant difference was observed between Upland and Midland. This proves that Lowland had the highest level of lead deposit. However, still the amounts of lead deposit among the three geographic locations were higher than a human body can tolerate.