

Research report

study of Ecosystem Interactions through soil / plant / insect relationships
in Mae Tha District and Pa Sang District of Lamphun Province, Thailand

Research team

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2. Kiatkawin Phunchaisri Secondary 2 / Grade 8
3. Narumon Kuangwaen Secondary 2 / Grade 8
4. Khanchanok Givarangsawad Secondary 2 / Grade 8
5. Lalynn Chantra Secondary 2 / Grade 8

Advisor

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DARA ACADEMY

Muang District, Chiang Mai Province

This research is part of the Earth Systems Science course.
Darawittayalai School, Semester 2, Academic Year 2025.

General information about the school.

Dara Academy

196 Kaew Nawarat Road, Wat Ket Subdistrict, Mueang District,
Chiang Mai 50000, Thaila

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Abstract

Research Title: A Study of Ecosystem Relationships Between Soil, Plants, and Insects in Mae Tha and Pa Sang Districts, Lamphun Province

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3. Narumon Kuangwaen Secondary 2 NO.21
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5. Lalynn Chantra Secondary 2 NO.34

Grade level: Secondary school year 2

Advisor: Professor Thapakorn Kaewprom

School : Dara academy

The study of the relationship between soil, plants, and insects is crucial in explaining the processes of ecosystems and sustainable agricultural production. This research aims to study the symbiotic relationship between these organisms. The study of the relationship between soil, plants, and insects is crucial in explaining the processes of ecosystems and sustainable agricultural production. This research aims to study the symbiotic relationship between these organisms. The study of the relationship between soil, plants, and insects is crucial in explaining the processes of ecosystems and sustainable agricultural production. This research aims to study the

Acknowledgement

The research on the study of the relationship between ecosystems from the relationship between soil, plants and insects in Mae Tha District and Pa Sang District, Lamphun Province has been successfully completed. The researcher would like to thank those involved and support in all aspects on this occasion.

I would like to thank the research advisor very much for kindly giving advice, checking, correcting defects and encouraging the researchers throughout the research process until this research is more complete.

I would like to thank the relevant agencies and personnel in Mae Tha District and Pa Sang District, Lamphun Province, including community leaders and people in the area for their cooperation, facilitating and generous information that is useful for field data collection.

I would like to thank my fellow students and those who have helped in collecting data, analysing soil, plant and insect samples, as well as giving advice and encouragement to researchers. Finally, the researcher would like to thank the family for their support in terms of encouragement, time and various factors until this research was successfully completed. The value and benefits that should be obtained from this research The researcher would like to give it to all the benefactors mentioned above.

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Introduction

Background and Significance

Terrestrial ecosystems are sustained by a delicate balance of biological and physical components. Soil, plants, and insects are not separate from each other (Lavelle et al., 2016; GLOBE, 2024). Understanding this trilateral relationship is therefore crucial.

Terrestrial ecosystems are complete due to the balance and interaction between physical and biological components, which play a crucial role in nutrient cycling and maintaining the food chain structure. Soil serves as a reservoir of nutrients.

The researchers therefore aimed to study the relationship between ecosystem components in terrestrial ecosystems (soil/plants/insects) in Lamphun Province.

Research questions

How do soil characteristics (pH/NPK/land cover) and soil properties relate to the number of insect species and ecosystems? If so, how?

hypothesis

Soil characteristics (pH/NPK/ground cover) affect the relationship between insect species and ecosystems.

objective

1. To study the characteristics of different soils (pH, NPK, soil cover).
2. To study the soil properties that affect the relationship, number, and types of insects in an ecosystem
3. To study the indices that affect the relationship..

The results obtained from the research.

1. Obtained information to study the characteristics of different soils (pH, NPK, soil cover).
2. Obtained information to study soil properties that affect and are related to the number of insect species and ecosystems.

Research scope

1. Study area

Longan orchard of a farmer in Mae Tha District.

Longan orchard of a farmer in Pa Sang District.

Safflower orchard of a farmer in Pa Sang District.



Related factors that need to be studied.

The factors to be studied include soil factors, plant factors, and insect factors, examining the relationship between soil properties, plant type, and plant diversity. And the types and number of insects in Mae Tha and Pa Sang districts, Lamphun province.

ช่วงเวลาที่ทำวิจัย

Order	Operations	August 2568	September 2568	October 2568	November 2568	December 2568	January 2569
1	Conduct research						
2	Study preparation (scope and work plan definition)						
3	Conduct research						
4	Analyze data						
5	Discussion and conclusion						
6	เขียนรายงานวิจัย						

research operations

Research scope

Longan orchard of a farmer in Mae Tha District.

Longan orchard of a farmer in Pa Sang District.

Safflower orchard of a farmer in Pa Sang District.

Materials and equipment

1. NPK meter
2. Litmus paper
3. Beaker
4. Glass stirring rod
5. Digital scale

How to conduct research

Steps in conducting research

Part 1: Studying the Relationship Between Soil, Plants, and Insects

The research area was defined by surveying and identifying three study points in Lamphun Province.

Data collection was scheduled on three separate occasions. Check the soil's pH level using litmus paper, performing three measurements and recording the results.

Measure the mineral content of the soil using an NPK meter. Perform three measurements and record the data. Answer the data obtained and compare the three measurements.

Part 2: How much do soil pH and mineral content affect plant growth?

Collect soil samples at all three study locations using a shovel. Place the soil samples in boxes and record the images.

data analysis

The statistics used to analyze the data included the percentage of land cover to compare soil quality, land cover, and insect species at each study point according to the data collection time period.

Research results

- Mae Tha District has an average temperature of 26 degrees Celsius, a soil pH of 7, and moderate levels of some nutrients such as phosphorus (P), potassium (K), and nitrogen.
- Pa Sang District (raw water area) has an average temperature of 27 degrees Celsius, a neutral soil pH (7), and some nutrients are at a moderate to high level.
- Pa Sang District (another area) has an average temperature of 27 degrees Celsius, a soil pH of 7, and nutrient levels that differ from the area using raw water.
- Overall, the environmental conditions in terms of temperature and soil pH in all three areas were found to be very similar.

Summary and discussion of results.

The results indicate that temperatures in the range of 26–27 Celsius and neutral soil pH (pH 7) are key factors promoting plant growth and indirectly influencing insect diversity and abundance within ecosystems. Healthy plant growth provides essential food sources and habitats for insects, thereby supporting insect communities.

Although soil nutrient levels, such as phosphorus and potassium, varied among the study areas, these differences were not found to result in a clear reduction in insect abundance. This suggests that insects are capable of adapting to soils with varying nutrient conditions, provided that fundamental factors such as temperature and soil pH remain within suitable ranges.

In the case of Pa Sang District, where untreated (raw) water is used for agricultural purposes, the findings may reflect the role of irrigation water in influencing soil quality and overall ecosystem conditions. However, the relatively high n values observed indicate that the ecosystem has not been severely impacted.

In summary, the consistently high n values across all three districts reflect a balanced soil–plant–insect system and indicate that the physical soil properties and environmental conditions in Lamphun Province remain conducive to biodiversity.

References

Scientific Measurements Based on GLOBE Protocols for the Development of Scientific Research

GLOBE Measurement Protocols: Soil Mineral Measurement. (November 2025). Retrieved from

<https://drive.google.com/file/d/12gPWAZPGyi900iBbJBw0FbfuSmykN0Pb/view>

GLOBE Measurement Protocols: Soil pH Measurement. (November 2025). Retrieved from

[URL not specified]

GLOBE Measurement Protocols: Use of Insects and Ground Cover as Indicators of Soil Quality.

(November 2025). Retrieved from

<https://globefamily.ipst.ac.th/globe-protocols/biosphere>

I AM A DATA SCIENTIST

This research qualifies for the I Am a Data Scientist badge because it involves collecting, analyzing, and interpreting data on soil properties and insect diversity in Lamphun Province. The study uses datasets obtained from field observations and measurements to identify relationships between soil conditions and insect populations. Limitations of the data are discussed, and the results are used to explain current ecosystem conditions.

I AM A COLLABORATOR

This project meets the criteria for the I Am a Collaborator badge because it is conducted by a research team with clearly defined roles, such as soil analysis, insect identification, data collection, and data analysis. Collaboration among team members ensures accurate data collection and interpretation. If external experts or local communities are involved, their contributions enhance the quality and relevance of the research by providing specialized knowledge and local ecosystem insights.

I AM AN EARTH SYSTEM SCIENTIST

This research earns the I Am an Earth System Scientist badge because it investigates the interconnectedness between soil (lithosphere), insects (biosphere), and ecological processes within Lamphun's ecosystem. The study demonstrates how changes in soil properties influence insect communities and how insects, in turn, affect soil quality and ecosystem balance. By analyzing these interactions, the project highlights the dynamic and interconnected nature of Earth's systems.

Soil Temperature	
Measured Date:	2025-01-30
Organization Name:	Dara Academy
Site ID:	409351
Site Name:	Soil in Mae Tha District
Country Name:	Thailand
Country Code:	THA
Latitude:	18.42274
Longitude:	99.04157
Elevation:	350.6m
Measured At:	2025-01-30T07:30:00
Solar Measured At:	2025-01-30T13:51:00
Depth Level:	10 cm
Soil Current Temperature:	26 °C

Soil Temperature	
Measured Date:	2025-01-30
Organization Name:	Dara Academy
Site ID:	409351
Site Name:	Soil in Mae Tha District
Country Name:	Thailand
Country Code:	THA
Latitude:	18.42274
Longitude:	99.04157
Elevation:	350.6m
Measured At:	2025-01-30T07:30:00
Solar Measured At:	2025-01-30T13:51:00
Depth Level:	5 cm
Soil Current Temperature:	27 °C

Soil Temperature	
Measured Date:	2025-11-30
Organization Name:	Dara Academy
Site ID:	409466
Site Name:	Namdip pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.44
Longitude:	98.98
Elevation:	349.8m
Measured At:	2025-11-30T07:30:00
Solar Measured At:	2025-11-30T14:18:00
Depth Level:	10 cm
Soil Current Temperature:	26 °C

Soil Temperature	
Measured Date:	2025-11-30
Organization Name:	Dara Academy
Site ID:	409467
Site Name:	pasang pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.525
Longitude:	99.94
Elevation:	402.2m
Measured At:	2025-11-30T07:30:00
Solar Measured At:	2025-11-30T14:21:00
Depth Level:	5 cm
Soil Current Temperature:	27 °C

Soil Temperature	
Measured Date:	2025-11-30
Organization Name:	Dara Academy
Site ID:	409466
Site Name:	Namdip pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.44
Longitude:	98.98
Elevation:	349.8m
Measured At:	2025-11-30T07:30:00
Solar Measured At:	2025-11-30T14:18:00
Depth Level:	5 cm
Soil Current Temperature:	27 °C

Soil Temperature	
Measured Date:	2025-11-30
Organization Name:	Dara Academy
Site ID:	409467
Site Name:	pasang pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.525
Longitude:	99.94
Elevation:	402.2m
Measured At:	2025-11-30T07:30:00
Solar Measured At:	2025-11-30T14:21:00
Depth Level:	10 cm
Soil Current Temperature:	28 °C

Soil pH	
Measured Date:	2025-11-24
Organization Name:	Dara Academy
Site ID:	409467
Site Name:	pasang pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.525
Longitude:	99.94
Elevation:	402.2m
Collected On:	2025-11-24T00:00:00
pH:	7
Horizon Top Depth:	0 cm
Horizon Bottom Depth:	10 cm
Horizon Number:	1
Reference Depth Level5cm:	true
Reference Depth Level10cm:	true
Ph Method:	meter
Comments:	

Soil pH	
Measured Date:	2025-11-24
Organization Name:	Dara Academy
Site ID:	409466
Site Name:	Namdip pasang
Country Name:	Thailand
Country Code:	THA
Latitude:	18.44
Longitude:	98.98
Elevation:	349.8m
Collected On:	2025-11-24T00:00:00
pH:	7
Horizon Top Depth:	0 cm
Horizon Bottom Depth:	10 cm
Horizon Number:	1
Reference Depth Level5cm:	true
Reference Depth Level10cm:	true
Ph Method:	meter
Comments:	

Soil pH	
Measured Date:	2025-11-24
Organization Name:	Dara Academy
Site ID:	409351
Site Name:	Soil in Mae Tha District
Country Name:	Thailand
Country Code:	THA
Latitude:	18.42274
Longitude:	99.04157
Elevation:	350.6m
Collected On:	2025-11-24T00:00:00
pH:	7
Horizon Top Depth:	0 cm
Horizon Bottom Depth:	10 cm
Horizon Number:	1
Reference Depth Level5cm:	true
Reference Depth Level10cm:	true
Ph Method:	meter
Comments:	

**NASA Media Release Form for Parent or Guardian of Minor
(continued)**

Name of Minor (First and Last):

Nicharas Summakasempat

Name of Parent / Legal Guardian / Legal Representative of Minor (First and Last):

Aun yapat Summakasempat

Signature of Parent / Legal Guardian / Legal Representative of Minor:

By signing your name below, you agree that you have read the foregoing and fully understand its contents.



Relationship to Minor: Mother

Today's Date: 29/01/69

Contact information for Parent / Legal Guardian / Legal Representative of Minor:

Address: No. 233/304 M.19 San Pu Loei, Doi Saket District

Chiang Mai THAILAND

Telephone: 0815646595

Email Address: aun yapat@web1.dara.ac.th

**NASA Media Release Form for Parent or Guardian of Minor
(continued)**

Name of Minor (First and Last):

Kiatkawin Phunchaisri

Name of Parent / Legal Guardian / Legal Representative of Minor (First and Last):

Jongrak Phunchaisri

Signature of Parent / Legal Guardian / Legal Representative of Minor:

By signing your name below, you agree that you have read the foregoing and fully understand its contents.

Jongrak P.

Relationship to Minor: Mother

Today's Date: 29/01/26

Contact information for Parent / Legal Guardian / Legal Representative of Minor:

Address: 80 Moo. 12 Nonghan, Sansai District Chiang Mai 50290
Thailand

Telephone: 062-3593245

Email Address: m-jongrak@hotmail.com

NASA Media Release Form for Parent or Guardian of Minor (continued)

Name of Minor (First and Last):

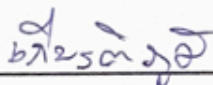
Khanchanok jivarangwad

Name of Parent / Legal Guardian / Legal Representative of Minor (First and Last):

Kiattipoom jivarangwad

Signature of Parent / Legal Guardian / Legal Representative of Minor:

By signing your name below, you agree that you have read the foregoing and fully understand its contents.



Relationship to Minor: Father

Today's Date: 29/01/26

Contact information for Parent / Legal Guardian / Legal Representative of Minor:

Address: 119 moo 6, Saraphi subdistrict, Saraphi District, Chiang Mai

Province 50140, Thailand

Telephone: 080-0807939

Email Address: khane758@gmail.com

**NASA Media Release Form for Parent or Guardian of Minor
(continued)**

Name of Minor (First and Last):

Lalynn Chantra

Name of Parent / Legal Guardian / Legal Representative of Minor (First and Last):

Ploylalynn Chantra

Signature of Parent / Legal Guardian / Legal Representative of Minor:

By signing your name below, you agree that you have read the foregoing and fully understand its contents.



Relationship to Minor: Mother

Today's Date: 29/1/26

Contact information for Parent / Legal Guardian / Legal Representative of Minor:

Address: 129 / 250 Moo 2 Wararom Charoen Muang Soi 3/4 .Ton Pao

Subdistrict San Kamphaeng district Chiang Mai Province 50130

Telephone: 063-041-2996

Email Address: Ploylalynn28@gmail.com

NASA Media Release Form for Parent or Guardian of Minor (continued)

Name of Minor (First and Last):

Narumon kuangwaen

Name of Parent / Legal Guardian / Legal Representative of Minor (First and Last):

Bongkotnaphasorn kuangwaen

Signature of Parent / Legal Guardian / Legal Representative of Minor:

By signing your name below, you agree that you have read the foregoing and fully understand its contents.

Bongkotnaphasorn

Relationship to Minor: Mother

Today's Date:

29/01/26

Contact information for Parent / Legal Guardian / Legal Representative of Minor:

Address: 120 M.2 San po Loei Doi Saket Chiang Mai 50220 Thailand

Telephone: 080-4745962

Email Address: tubtim1986@icloud.com