EFFECTS OF TERMINALIA CATAPPA AND HOPEA ODORATA LEAVES ON SOIL QUALITY AND PETRAEOVITEX WOLFEI GROWTH

Wichienmatu School

GLOBEPROGRAM®

Abstract

This study investigated soil quality and the effects of Terminalia catappa leaf fertilizer and Hopea odorata Roxb. leaf fertilizer on the growth of Petraeovitex wolfei at WichienMatu School, Trang Province. The objectives of the study were to examine soil quality factors influencing plant growth in areas amended with Terminalia catappa and Hopea odorata leaf fertilizers, to compare the growth performance of Petraeovitex wolfei under the two fertilizer treatments, and to analyze the relationship between soil quality parameters and plant growth characteristics. The research question focused on whether different types of leaf fertilizers cause differences in soil properties and plant growth outcomes.

A pot experiment was conducted using soils treated with Terminalia catappa and Hopea odorata leaf fertilizers under controlled conditions. Soil quality parameters, including soil pH, soil moisture content, and soil nutrient levels, were measured to assess changes in soil conditions. Plant growth was evaluated by measuring plant height and counting the number of leaves at regular intervals throughout the experiment. The results revealed clear differences in both soil quality and plant growth between the two treatments. Soils amended with Terminalia catappa leaf fertilizer showed more balanced soil pH, higher soil moisture, increased nutrient availability, and improved growth performance, including greater plant height and a higher number of leaves, compared to soils treated with Hopea odorata leaf fertilizer. These findings indicate that Terminalia catappa leaf fertilizer is more effective in improving soil quality and promoting the growth of Petraeovitex wolfei.

Keywords: Soil quality, Terminalia catappa fertilizer, Hopea odorata leaf fertilizer

Research Question

Asking Questions

1.Soil quality affecting the growth of Petraeovitex wolfei in the area where Terminalia catappa fertilizer and Hopea odorata leaf fertilizer are added in WichienMatu School. Is there a difference? How?

2. Is there a difference between the growth of the Petraeovitex wolfei treein the fertilized area of Terminalia catappa leaves and Hopea odorata leaves in Wichinmatu School?

3. Is there a difference between the growth of the golden garland treeand the fertilizer area of Terminalia catappa leaf and the fertilizer of Hopea odorata the leaf in WichienMatu School?

Introduction

Content Knowledge

Petraeovitex wolfei J. Sinclair is an ornamental flowering plant valued for its attractiveappearance and its important role in various auspicious ceremonies in Thailand. Successful cultivation of this plant, characterized by strong growth and consistent flowering, depends largely on soil quality. Soil functions as a source of nutrients and water, as well as providing physical support for plant roots. These factors directly influence nutrient uptake, physiological processes, and overall plant development.Soil is a vital natural resource within agricultural and ecological systems. Fertile soil typically contains sufficient organic matter, essential plant nutrients, and diverse soil microorganisms. These microorganisms play a crucial role in decomposing organic materials into forms that plants can absorb. However, continuous land use and inadequate soil management can lead to soil degradation, resulting in reduced fertility and plant productivity. Improving soil quality using environmentally friendly and locally available organic materials is therefore an important approach to sustainable land management.

Leaf litter from Terminalia catappa and Hopea odorata Roxb. (Takhian) represents common organic debris found in many Thai communities, including school environments. Terminalia catappa leaves contain organic matter and bioactive compounds that, when decomposed, can enrich the soil with nutrients and improve moisture retention. In contrast, Hopea odorata leaves are tougher and decompose more slowly, but they contribute to increasing soil organic matter and improving soil structure over time. Previous studies have shown that organic amendments derived from plant residues can enhance soil pH balance, microbial availability, and soil physical properties, thereby promoting better plant growth (Brady & Weil, 2016; Lal, 2015).This study aligns with the principles of the GLOBE Program, which emphasizes hands-on environmental observation, data collection, and analysis of Earth system interactions. By investigating soil quality and plant growth at Wichian Matu School, this research not only enhances students' understanding of soil–plant relationships but also provides practical knowledge applicable to local soil management. The findings can support sustainable gardening practices in schools and communities while promoting environmental awareness and responsible use of natural resources.

Research Methods

Planning Investigations

Describes the planning process

1. Study Site: The study area for the cultivation of Petraeovitex wolfei was at Wichienmatu School, Muaang District, Trang Province, Thailand

2. Variables in the Study:

Independent Variable: Type of leaf fertilizer

Terminalia catappa leaf fertilizer

Salix alejae leaf fertilizer

Dependent Variables:

Soil quality (pH, moisture, soil nutrients)

Growth of Petraeovitex wolfei plants (height, number of leaves)

Relationship between growth and *Terminalia catappa* and *Salix alejae* leaf fertilizers

Controlled Variables:

Soil type, water quantity, sunlight, pot size, study duration

3.Data Collection Tools

Materials and Equipment

-Soil Moisture Meter -N P K Soil Meter 4

-Soil Test Kit -PATTERY Test Kit

-Beaker -Plate

-Soil Container -Terminalia Catappa Leaf Fertilizer

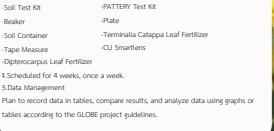
-Tape Measure -CU Smartlens

-Dipterocarpus Leaf Fertilizer

4.Scheduled for 4 weeks, once a week.

5.Data Management

Plan to record data in tables, compare results, and analyze data using graphs or tables according to the GLOBE project guidelines.

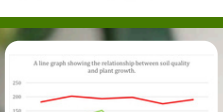


Carrying Out Investigations Describes what happened

2.1 Soil quality affecting the growth of Petraeovitex wolfei in the area where Terminalia catappa fertilizer and Hopea odorata leaf fertilizer are added in WichienMatu School.

2.2 Collecting data on the growth of Petraeovitex wolfei in the area where fertilizer is added to terminalia catappa and Hopea odorata Roxb leaves and Collected data on the growth of the Petraeovitex wolfei by studying the measurement of the height of the Petraeovitex wolf

2.3 Study the relationship between the growth of the Petraeovitex wolfei and the area where terminalia catalpa fertilizer and Hopea odorata fertilizer are added.



GLOBE Badges

Be a Collaborator

All team members are listed including students from the same school or schools from around the world, along with clearly defined roles, how these roles support one another and descriptions of each student's contribution. The descriptions clearly indicate the advantages of the collaboration. If the students collaborated with students from another school, describe how working with other schools improved the research.

Be a Data Scientist

The report includes in-depth analysis of students' own data as well as other data sources. Students discuss limitations of these data, make inferences about past, present, or future events, or use data to answer questions or solve problems in the represented system. Consider data from other schools or data available from other databases.

Make an Impact

The report clearly describes how a local issue led to the research questions or makes connections between local and global impacts. The students need to clearly describe or show how the research contributed to a positive impact on their community through making recommendations or taking action based on findings.

Results

Analyzing Data

The study examined the relationship between soil quality and the growth of Petraeovitex wolfei plants grown in pots fertilized with Terminalia catappa leaf fertilizer and Hopea odorata leaf fertilizer at Wichienmatu School. The results showed differences in soil moisture, soil pH, soil nutrient levels, and plant growth between the two treatments. Petraeovitex wolfei plants grown in pots amended with Terminalia catappa leaf fertilizer exhibited better growth than those grown in pots fertilized with Hopea odorata leaves. In addition, soil quality in pots treated with Terminalia catappa leaf fertilizer was generally higher than that in pots treated with takhian leaf fertilizer. These findings indicate that Terminalia catappa leaf fertilizer is more effective in improving soil quality and promoting the growth of Petraeovitex wolfei plants.

Discussion

Interpreting Data

The experimental results showed that Terminalia catappa leaf fertilizer improved soil quality and promoted better growth of Golden Trumpet Vine than Shorea robusta leaf fertilizer, supporting the hypothesis. Because Terminalia catappa leaves decompose easily, resulting in better growth of Golden Trumpet Vine, it demonstrates that the use of natural organic materials can improve soil quality, which aligns with the concept of sustainable agriculture.

Furthermore, the measured data showed that higher soil moisture and nutrient levels correlated with increased height and number of leaves of the Golden Trumpet Vine. However, the experiment was relatively short and the sample size was limited, which may affect the accuracy of the results. Therefore, errors may occur due to differences in sunlight, water availability, or the decomposition of different leaf types. These factors may cause variations in the experimental results. to be consistent with previous research reporting that organic fertilizer from plant residues increases soil fertility.

Conclusions

Drawing Conclusions & Next Steps

The experiment concluded that fertilizer from Terminalia catappa leaves improved soil quality and promoted the growth of Petraeovitex wolfei better than fertilizer from Shorea robusta leaves. This is consistent with the hypothesis that Terminalia catappa leaves decompose easily, increasing soil moisture and nutrients, resulting in increased height and number of leaves for the Petraeovitex wolfei. Although the experiment had limitations in terms of time and sample size, the study results confirm that the use of natural organic materials can increase soil fertility and aligns with the concept of sustainable agriculture.

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