Comparative Study of Air Quality in Areas with and without Phytoremediation Plants

Snake Plant

Wichienmatu School

THE GLOBE PROGRAM

Abstract

This environmental science research study, entitled "A Comparative Study of Air Quality in Areas with and without Phytoremediation Plants within Wichienmatu School, Mueang District, Trang Province," aims to compare air quality between areas planted with phytoremediation plants and areas without such plants. and was to investigate whether the presence of phytoremediation plants could influence microclimatic conditions, particularly relative air humidity and air temperature, within the school environment. The study area was divided into two distinct sections: an area planted with phytoremediation plants and an area without phytoremediation plants. Data were collected by measuring relative air humidity and temperature in both areas using appropriate environmental measurement instruments. The measurements were conducted under similar environmental conditions to ensure accuracy and reliability of the results. The findings revealed that the area with phytoremediation plants exhibited higher relative air humidity and a lower average air temperature compared to the area without phytoremediation plants. These results suggest that phytoremediation plants may contribute to improving local air quality by increasing moisture in the air and reducing ambient temperature through processes such as transpiration and shading. Overall, this study highlights the potential benefits of using phytoremediation plants to enhance air quality and create a healthier environment within educational institutions.

Research Questions

Asking Questions

1. Is there a difference in relative humidity between areas planted with phytoremediation plants and areas without phytoremediation plants?
2. Is there a difference in temperature between areas planted with phytoremediation plants and areas without phytoremediation plants?

Introduction

Currently, air pollution has become one of the most serious environmental problems affecting human health and quality of life worldwide. Rapid industrial development, urban expansion, and deforestation for the purpose of increasing human living spaces have significantly contributed to the deterioration of air quality. These activities have led to a reduction in the number of trees and green spaces that play a crucial role in producing oxygen and maintaining ecological balance. As a result, harmful pollutants and toxic substances accumulate in the atmosphere, posing potential risks to human health. Air pollution can directly impact the human body by causing respiratory problems, weakening the immune system, and allowing toxic substances to accumulate within the body over time. Prolonged exposure to polluted air may increase the risk of chronic diseases and negatively affect overall well-being. Therefore, finding effective and sustainable methods to improve air quality has become an important concern for communities, schools, and environmental organizations.One environmentally friendly and cost-effective solution to this problem is the use of plants with phytoremediation properties. Phytoremediation plants have the ability to absorb toxic substances from the air and surrounding environment, helping to reduce pollution naturally. These plants can absorb pollutants through microscopic pores on their leaves and transport the toxins to their roots. The toxins are then released into the soil, where microorganisms living around the roots break them down and use them as a food source. This natural process helps reduce environmental toxins while maintaining soil health.

In addition to removing pollutants, phytoremediation plants also play an important role in producing oxygen through photosynthesis. Oxygen is essential for human life, and an increase in oxygen levels can improve air quality and create a healthier environment. Moreover, the presence of plants can help regulate temperature and humidity, creating a more comfortable microclimate. For these reasons, the research team became interested in studying phytoremediation plants within the area of Wichienmatu School, Mueang District, Trang Province. This study focuses on four types of plants: Sansevieria trifasciata (snake plant), golden snake plant, dwarf snake plant, and emerald plant. These plants were selected due to their known ability to absorb toxins and their suitability for planting in school environments. The results of this study are expected to provide useful information on the effectiveness of phytoremediation plants in improving air quality and promoting a healthier environment within educational institutions and surrounding communities.

Research Methods

Planning Investions

Deseribes the planning process

Research Implementation

1. Measurement of Relative Humidity

Relative humidity was measured by installing a hygrometer in areas with phytoremediation plants and in areas without phytoremediation plants. The relative humidity was determined by calculating the temperature difference between the dry-bulb and wet-bulb hygrometers and comparing the values with the relative humidity table provided with the instrument. Then, the average relative humidity was calculated.

2. Measurement of Air Temperature

Air temperature was measured by installing a thermometer inside an instrument shelter. The thermometer was reset at solar noon and allowed to record temperature continuously for one day. Data were recorded at solar noon on the following day, and the average air temperature was calculated.

Carrying Out Investigations

Area	Research Methodology	
	Latitude(N)	Longitude(E)
Phytoremediation area	7.50419	99.62906
Non-phytoremediation area	7.50423	99.62887

GLOBE Badges

Be a Collaborator

The phytoremediation research team worked collaboratively in carrying out the research, data collection and the measurement of various parameters.

Be a Data Scientist

The phytoremediation research team presented the measurement results using tables and graphs to facilitate clear and easy interpretation.

Make an Impact

The phytoremediation research team is working with plants to absorb toxins in order to solve the problem of toxic air and create clean air.

Results

Analyzing Data

Table 1 shows the results of relative humidity measurements in the area planted with phytoremediation plants.

Sampling sit	Measurement	Relative Humidity(RH%)
Area planted with phytoremediation plant	Measurement No.1	100
	Measurement No.2	92
	Measurement No.3	86
	Measurement No.4	86
Average		91

Table 2 presents the results of relative humidity measurements in the area without phytoremediation plants.

Sampling sit	Measurement	Relative Humidity(RH%)
Area without phytoremediation plant	Measurement No.1	61
	Measurement No.2	85
	Measurement No.3	79
	Measurement No.4	73
Average		74.5

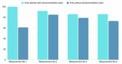
Table 3 presents the results of air temperature measurements in the area planted with phytoremediation plants.

Sampling sit	Measurement	Temperature(°C)
Area planted with phytoremediation plant	Measurement No.1	31.5
	Measurement No.2	29
	Measurement No.3	31
	Measurement No.4	31
Average		30.62

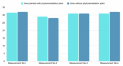
Table 4 presents the results of air temperature measurements in the area without phytoremediation plants.

Sampling sit	Measurement	Temperature(°C)
Area without phytoremediation plant	Measurement No.1	32
	Measurement No.2	28
	Measurement No.3	31
	Measurement No.4	32
Average		30.75

Bar chart 1 shows a comparison of relative humidity between the area planted with phytoremediation plants and the area without phytoremediation plants.



Bar chart 2 shows a comparison of air temperature between the area planted with phytoremediation plants and the area without phytoremediation plants.



Discussion

The higher relative air humidity observed in the area with phytoremediation plants may be attributed to transpiration processes, in which plants release water vapor into the air. This process can increase local humidity and create a more comfortable microclimate. Additionally, the slightly lower air temperature in the planted area may result from shading and evaporative cooling provided by the plants, which help reduce heat accumulation in the surrounding environment. Although the temperature difference in the two areas are relatively small, the results indicate a positive trend toward air quality improvement associated with phytoremediation plants. Further studies with longer observation periods and additional environmental parameters are recommended to better understand the full impact of phytoremediation plants on air quality.

Conclusions

The comparison of air quality between areas with and without phytoremediation plants within Wichienmatu School shows that the area planted with phytoremediation plants had higher relative air humidity and slightly lower average air temperature. Specifically, the planted area recorded a relative humidity of 91% and an average temperature of 30.63℃, while the non-planted area showed a relative humidity of 74.5% and an average temperature of 30.75℃. These findings suggest that phytoremediation plants can contribute to improving microclimatic conditions by increasing air humidity and reducing air temperature.

Bibliography

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