



# The Study of Carbon Sequestration in *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang 2022-2024



Investigators : Natakoranon Kuaseng Chonlatid Limthong Tanakorn O-mark

Class : secondary 2

Advisor : Sirikhwan Nuphuti

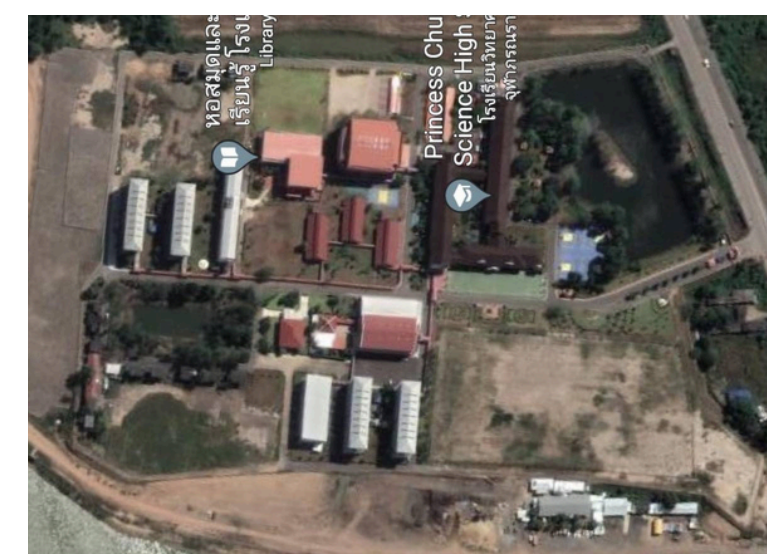
School : Princess Chulabhorn Science High School Trang

## Abstract

The purpose of this project is to study Carbon Sequestration in *Alstonia scholaris* and *Barringtonia acutangula* in Princess Chulabhorn Science High School Trang, to study the growth of each tree species, to study the carbon storage of each tree species in the school and to study the effect of soil quality on the carbon storage of each tree species in the school by specifying study points and surveyed the tree species during 2023-2025. We do tree observation using the GLOBE observer trees height app, which is the height and circumference, which was then used to calculate the biomass and to analyze the amount of carbon storage according to the allometric equation and using the Carbon-Storage app. We use all this information to create tree maps in the school. The soil quality was examined with the four plant species using the GLOBE soil protocol, i.e., pH, soil moisture, soil texture, soil fertility (NPK), and soil organic matter. The study found that the growth showed increased height, circumference, and carbon storage for all species. When analyzing the statistical values using ANOVA, it was found that height, circumference, and increased carbon storage significantly differed. The dominant tree with the highest average increase in height and circumference are *Alstonia scholaris* and *Barringtonia acutangula* respectively. *Alstonia scholaris* contains the highest percentage of soil moisture and organic matter. The continuous increase in the circumference of *Barringtonia acutangula* leads to a greater biomass, resulting in a higher carbon sequestration capacity compared to *Alstonia scholaris*. This information demonstrates that tree growth is closely related to the physiological mechanisms and structural characteristics of each species. Additionally, environmental factors such as soil quality play a crucial role in the growth rate and carbon storage potential of plants. So, every school nationwide should plant Yang trees to increase green areas and help absorb carbon dioxide in nature.

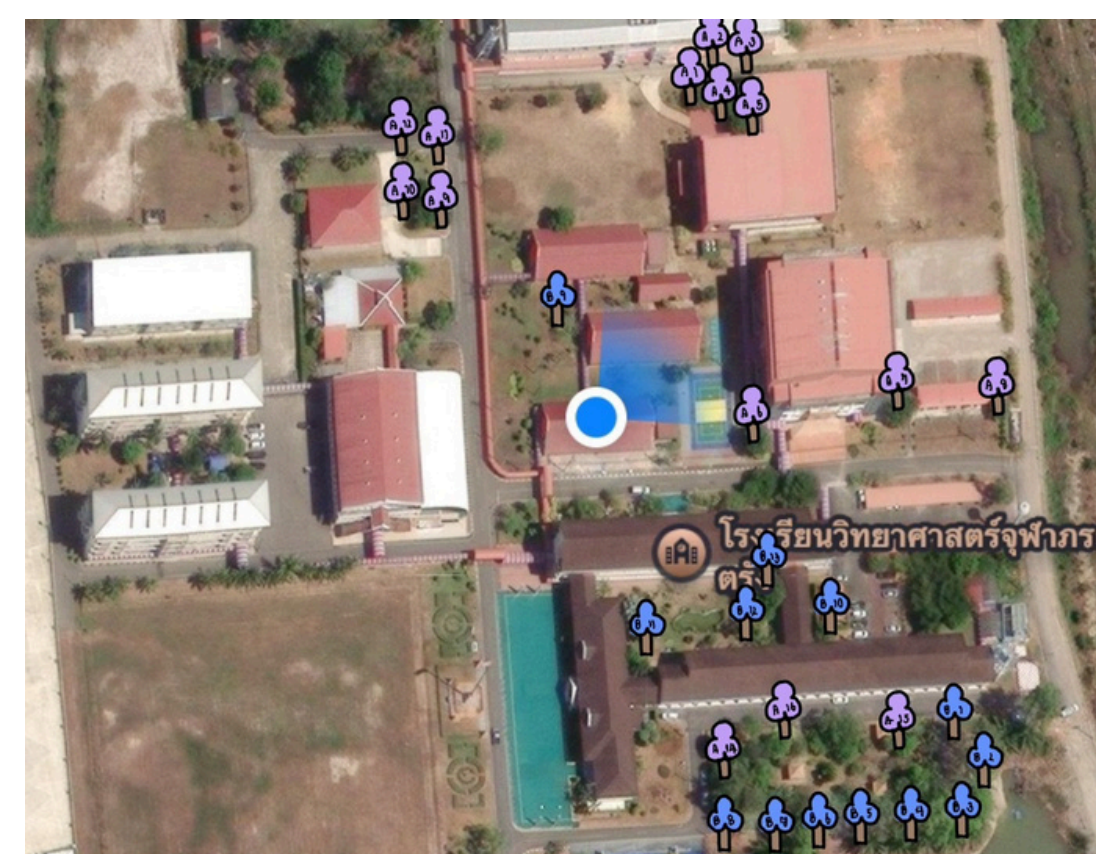
## method

### 1 Determination of Study Sites

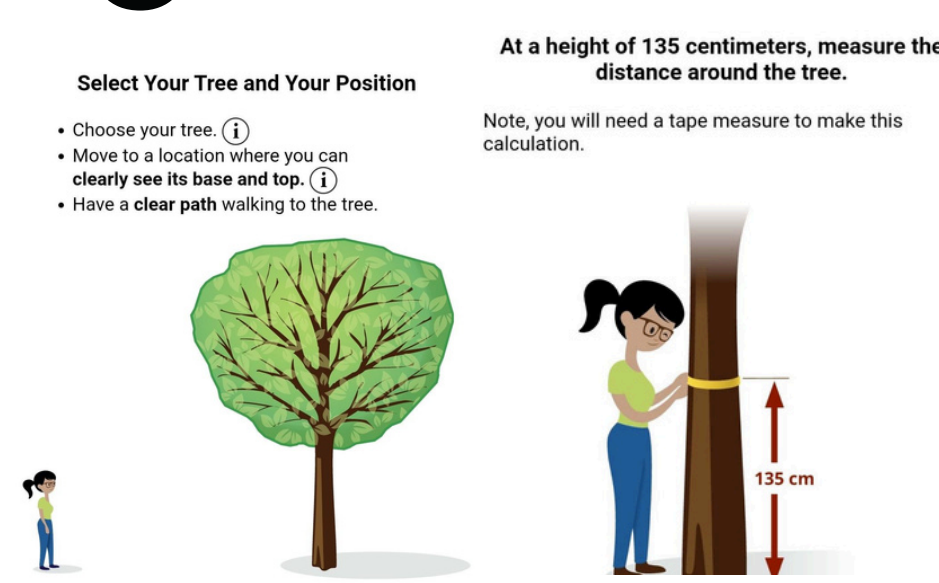


Princess Chulabhorn Science High School Trang

### 2 Tree mapping



### 3 Tree Data Collection



Measure tree height and trunk circumference using the GLOBE Observer app.

### 4 Calculate the amount of carbon sequestered using the formula.

$$W_s = 0.0396D^2 H^{(0.9326)}$$
$$W_b = 0.00348D^2 H^{(1.0270)}$$
$$W_l = (28.0/(W_s + W_b) + 0.025)^{(-1)}$$

### 5 Soil uality inspection

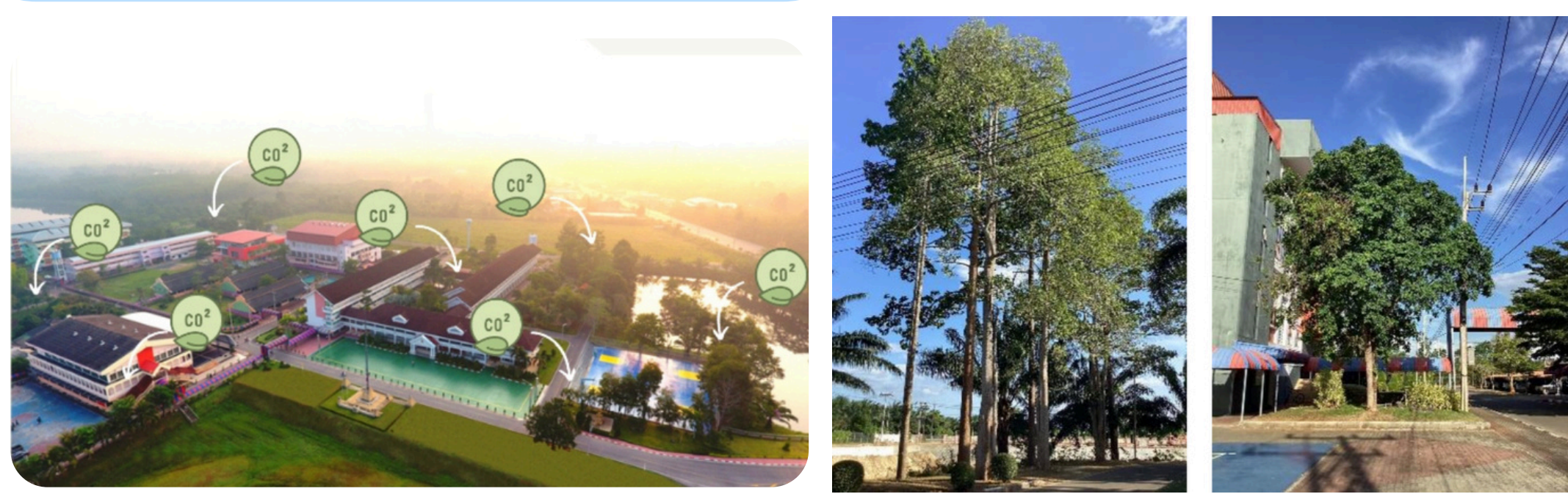
With using GLOBE soil protocol



### 6 Data analysis

- Average
- Comparison 2022-2024

## Introduction



## Research Questions

1. The growth of *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang differs?
2. The carbon sequestration capacity of *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang differs?
3. Soil quality affects the carbon sequestration capacity of *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang differently?

## instrument



## Acknowledgements

The study on carbon sequestration of *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang 2022-2024 has been successfully completed. We would like to express our gratitude to the school administrators and teachers of Princess Chulabhorn Science High School Trang for their support. Special thanks to Teacher Sirikhwan Nuphuti for her valuable advice, guidance, and suggestions for improvement, which have been highly beneficial to our project and contributed to its successful completion.

## References

- Plant Information, Digital Agriculture Database: *Barringtonia acutangula* and *Alstonia scholaris*. Retrieved on February 2, 2025, from the website <https://data.addrun.org/plant/search-plant-data>
- GLOBE Observer: Collecting Tree Height and Circumference. Retrieved on November 3, 2024, from the website <https://observer.globe.gov/do-globe-observer/trees/taking-observations>
- National Forest Inventory: Formula for Calculating Carbon Sequestration Using Tree Height and Circumference. Retrieved on November 3, 2024, from the website [https://www.climateactionreserve.org/wpcontent/uploads/2017/07/FPP\\_Quantification\\_Guidance\\_\\_062817.pdf](https://www.climateactionreserve.org/wpcontent/uploads/2017/07/FPP_Quantification_Guidance__062817.pdf)

Chart Showing the Height of *Alstonia scholaris* and *Barringtonia acutangula*

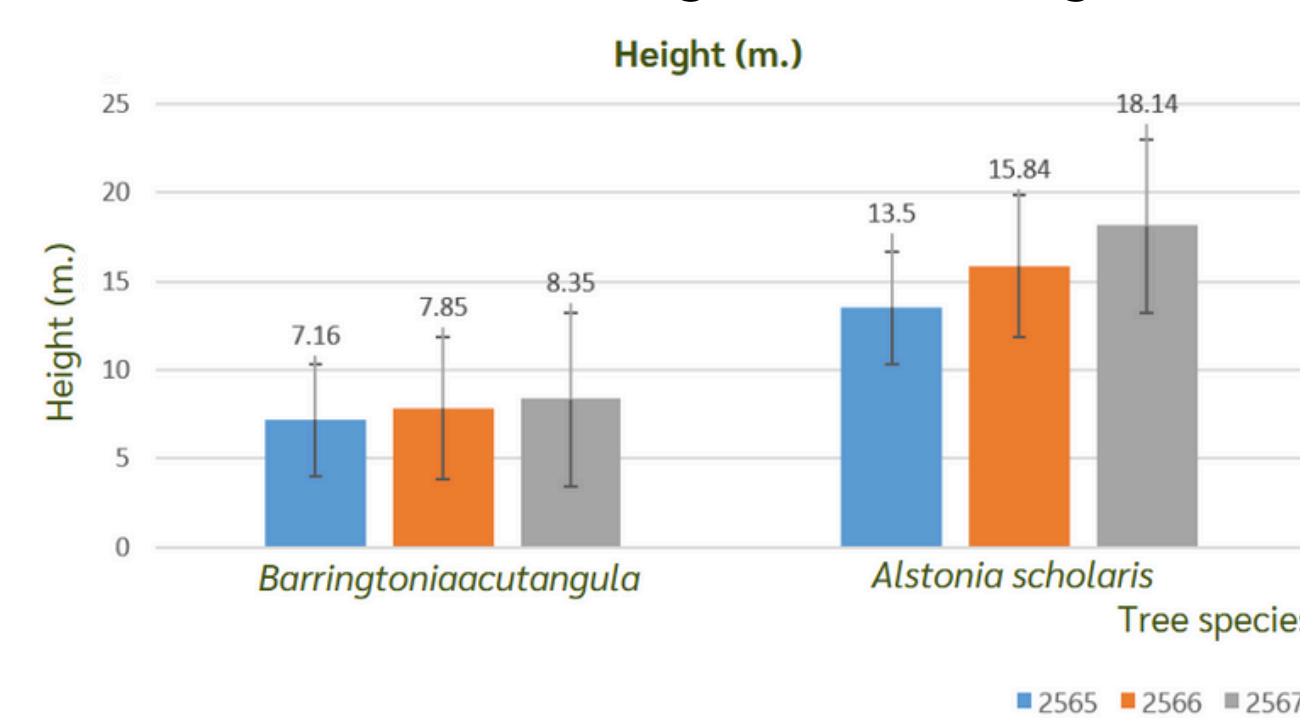


Chart Showing the Circumference of *Alstonia scholaris* and *Barringtonia acutangula*

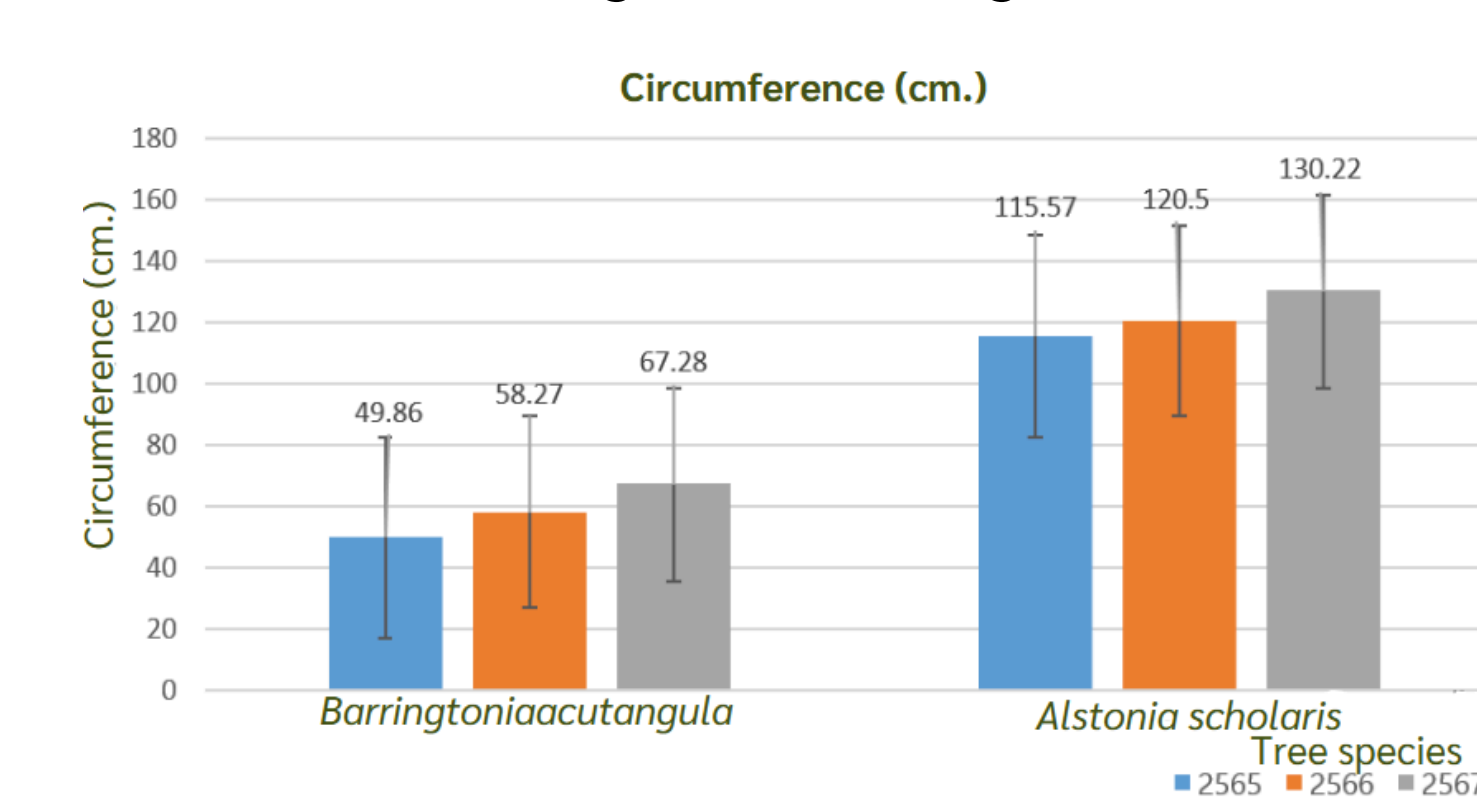


Chart Showing the Carbon Sequestration of *Alstonia scholaris* and *Barringtonia acutangula*

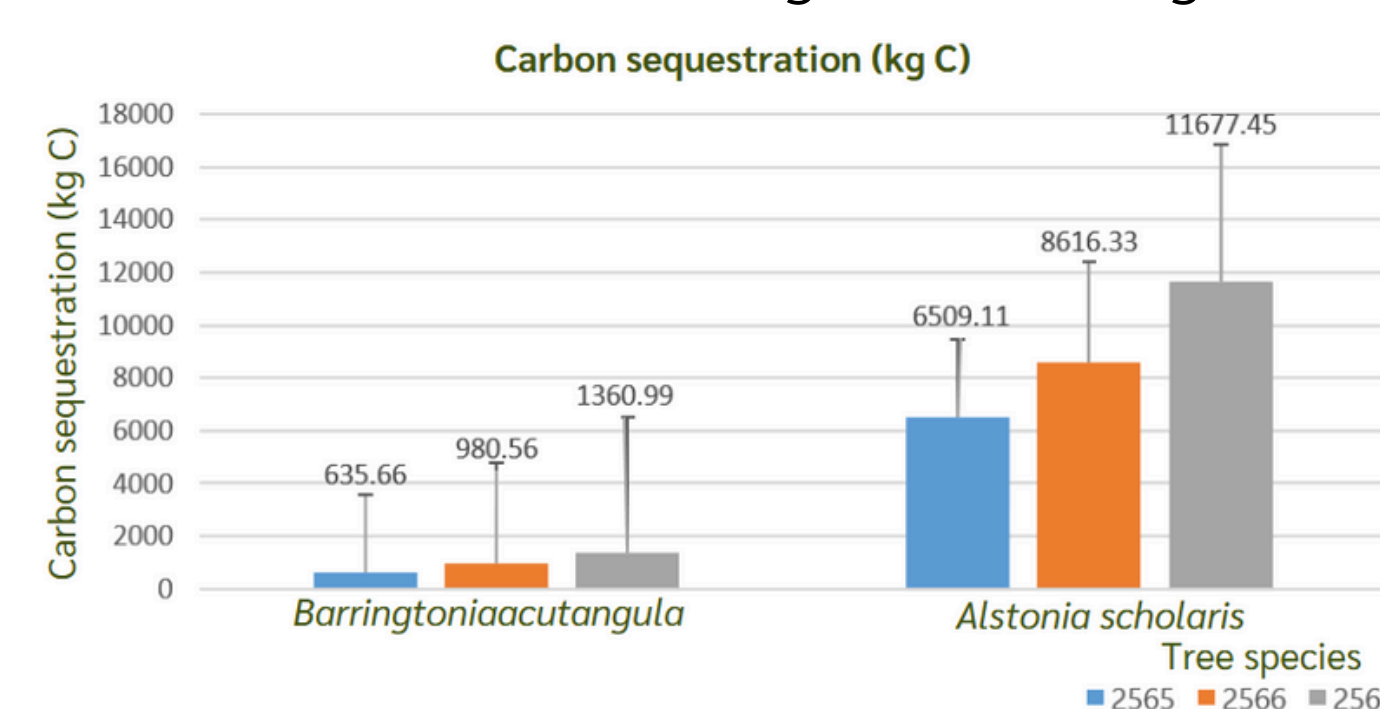


Table Showing Soil Quality

Tree species	<i>Barringtonia acutangula</i>	<i>Alstonia scholaris</i>
PH	6.67	5.67
Soil moisture	4.25	2.83
Soil texture	Sandy loam	Sandy loam
N	high	low
P	high	low
K	trace	trace
Soil organic matter	45.15	45.16

## Conclusion

The growth of *Alstonia scholaris* and *Barringtonia acutangula* at Princess Chulabhorn Science High School Trang during 2022-2024 showed statistically significant differences. *Alstonia scholaris* exhibited a higher average increase in height, while *Barringtonia acutangula* showed a greater average increase in circumference. Moreover, the carbon sequestration capacity of *Barringtonia acutangula* increased significantly more than that of *Alstonia scholaris*, indicating distinct growth patterns between the two species. The study found that soil quality influenced tree growth. The soil around *Alstonia scholaris* had higher moisture content, organic matter, and nutrient levels (NPK) than the soil around *Barringtonia acutangula*. *Alstonia scholaris* is a fast-growing tree that primarily exhibits vertical growth (primary growth) due to the activity of the apical meristem, enabling the tree to compete for sunlight. However, since the studied trees were 20 years old, the rate of height increase had slowed. In contrast, *Barringtonia acutangula* primarily grows by expanding its trunk diameter through the activity of the cambium secondary growth, resulting in a rapid increase in circumference. The continuous expansion of the trunk in *Barringtonia acutangula* contributes to greater biomass, leading to a higher carbon sequestration capacity than *Alstonia scholaris*. This finding highlights the relationship between tree growth patterns, physiological mechanisms, and species-specific structures. Additionally, environmental factors such as soil quality play a crucial role in determining the growth rate and carbon storage capacity of these plants.