Research title: Study on the effect of soil quality to survival and growth of small

leaved mangrove tree

Research Team: Passara Onkaew, Wanasa Prakong, Annita Susuk

Level: Primary School

Advisors: Punsaya Trakunwatthana and Punnika Boonyang

Scientist: Assoc. Prof. Dr. Mullica Charoensuthasini

School: Banmodtanoy school

....

Abstract

The objective of this study is to find soil quality that suitable for planting small leaved mangrove by measuring rate of survival and growth. Study site perform at Modtanoy school during 4 November 2022 to 13 January 2023. Mangrove pods were planted at three 1.2 x 3 rectangular plots. First plot contained with costal sandy soil, second plot contained with semi costal soil and the third contained loamy mangrove forest soil and all three treatments were planted with 200 mangrove pods each. Data of shoots and number of leaves were measuring once a week and last for 10 weeks. N P K, soil pH and organic matter were also measured before and after experiment of three plots and found that the shoot and number of leaves growth rate were not different in all the three plots. Mangrove seeding in the first plot shown most survival rate among of them and also soil pH found no different before and after experiment. But, only N element in the first plot found reducing after experiment, it also shown that survival rate in the first plot is good between the three plots.

Keyword: soil quality, survival rate, small leaved mangrove

Introduction

Small leaved mangrove (*Rhizophora apiculate*) is one of 12 families mangrove found in Trang province having 153,780 rai (24,608 ha) of mangrove forest. This mangrove tree is ever green tropical mangrove, height 20-40 m.

Banmodtanoy community of Kantang district having totally 2,640 rai (422 ha) of mangrove forest and people in the community got benefit from the forest, besides the mangrove can be used as herbal medicine, fire wood, constructing and fishing equipment, while the community go larger more population, it on the contrary the mangrove forest is contracting.

Research Questions

1. What is the most suitable soil for growing small leaved mangrove?

2. Does different soil quality effect the growth of small leaved mangrove?

Research hypothesis

1. Small leaved mangrove can be grown to any soil.
2. Different soil effect the growth of small leaved mangrove.

Materials and equipment

1. Tape measurement and ruler
2. Oven, scale
3. Soil Quality Test Kit
4. Sieve, pH meter

Method

Study site

Research location is at Banmodtanoy school, Kantang district, Trang province. The area is at latitude 7.3073N and longitude 99.4197E. whereas laboratory test was conducted at Princess Chulabhorn Science High School Trang. 196 Moo 4, Trang Road-Sikao, Bang Rak

Subdistrict, Mueang Trang District, Trang Province. Located at latitude 7.5528442, longitude 99.5583281.

Picture 1 Study site at Banmodtanoy School

Treatments

Three rectangular 1.2 x 3 m. plots were prepared and each for containing soil from 3 places, first plot was soil from costal sandy soil, second plot soil from semi costal soil and the third from loamy mangrove forest soil.

Growth and survival collection

1. Collect healthy 600 pods from small leave mangrove.
2. Plant them in to the plot with density 200 pods/plot.
3. 50 pods was sampled for measurement.
4. Measure shoot growth each week for 10 weeks period.
5. Count number of leave each week for 10 weeks period.
6. Observe survival rate each week for 10 weeks period.

Soil data collection

1. Collect soil texture.

2. Analyze soil pH, N P K, organic matter by follow GLOBE protocol, before ang after experiment.

3. Perform GLOBE data entry.

Data analysis

1. Analyze soil pH, N P K, organic matter and growth (shoot and number of leave) of small leave mangrove.

2. Compare soil quality by using one way ANOVA

Results

1. **Growth and survival rate**

1.1 Shoot rate

After 10 weeks of shoot collecting, we found that all three treatment in each plots were not significant different, where as first plot was 23.36 cm., second 23.17 cm. and third plot 22.34 cm.
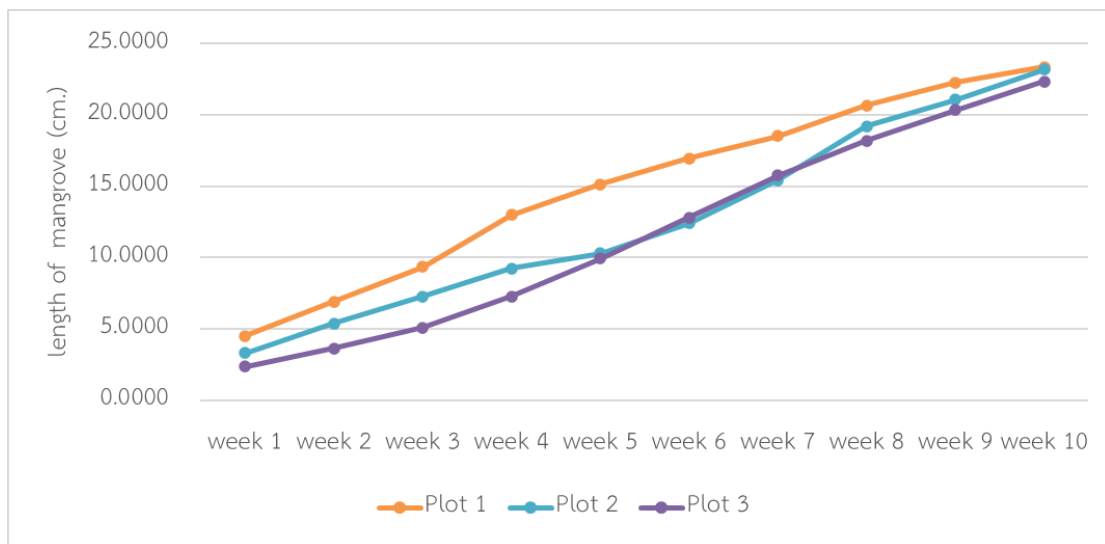
Picture 2 Shows of the lenght of mangrove at the 10 weeks.

1.2 Number of leave

After 10 weeks also found that number of leave in each plot shown no significant different. They were first plot 5.52 leaves, second plot 5.51 leaves and third plot 5.40 leaves
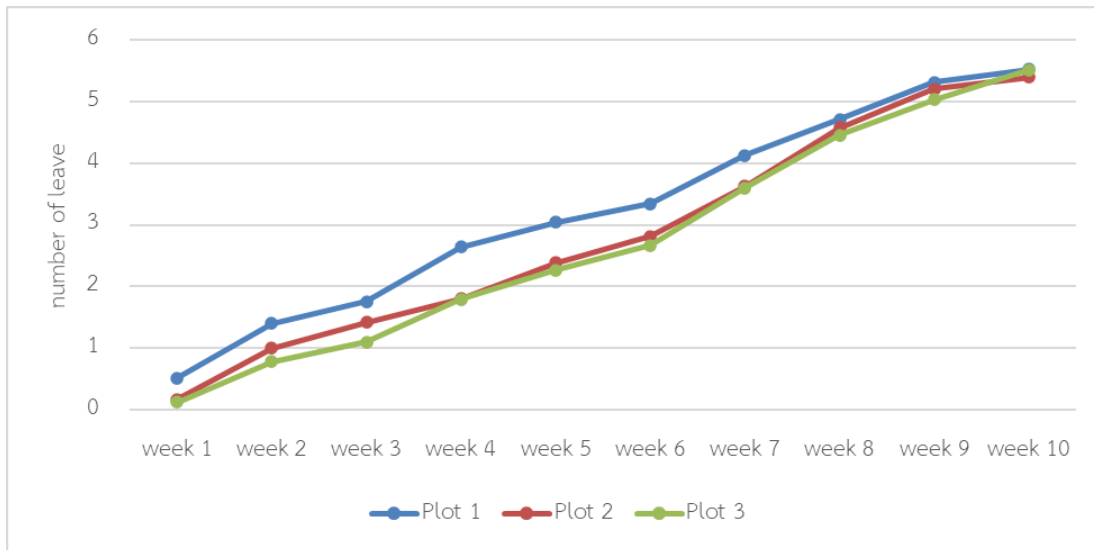
Picture 3 Shows of number of leave mangrove tree at the 10 weeks.

1.3 Survival rate

The reduction of survival rate started at the 4th week and after 10 weeks found that first plot survival rate was 76%, 2nd was 42% and 3rd was 59%
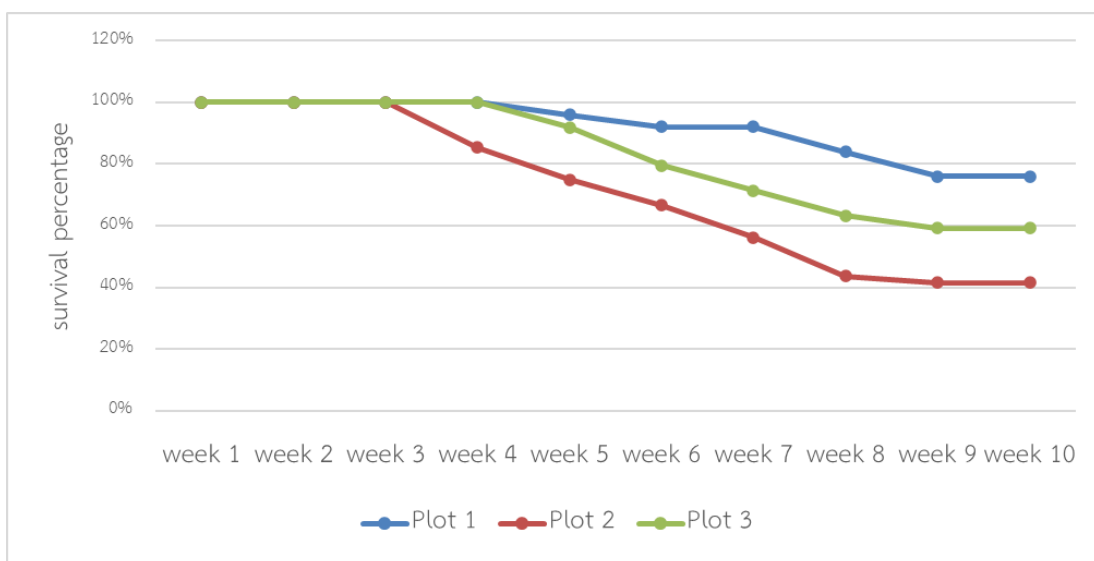
Picture 4 Shows Survival percentage of the 3 plots at the 10 weeks.

2. Soil quality

2.1 Soil Texture

Study of soil texture actually found that 1st plot is sandy soil, 2nd is silty clay loam , and 3rd is sandy loam soil.

Teble 1 Show Type of soil

| Study site	แหล่งของดิน	ลักษณะเนื้อดิน
Plot 1	sandy soil from the beach	sandy soil
Plot 2	Clay soil nearby intertidal	clay loam
Plot 3	Clay soil from intertidal	sandy loam soil

2.2 Soil pH (before/after)

Before and after experiment soil pH found that 1st plot was 6.5/6.7, 2nd plot 6.4/7.7, 3rd was 6.8/6.3
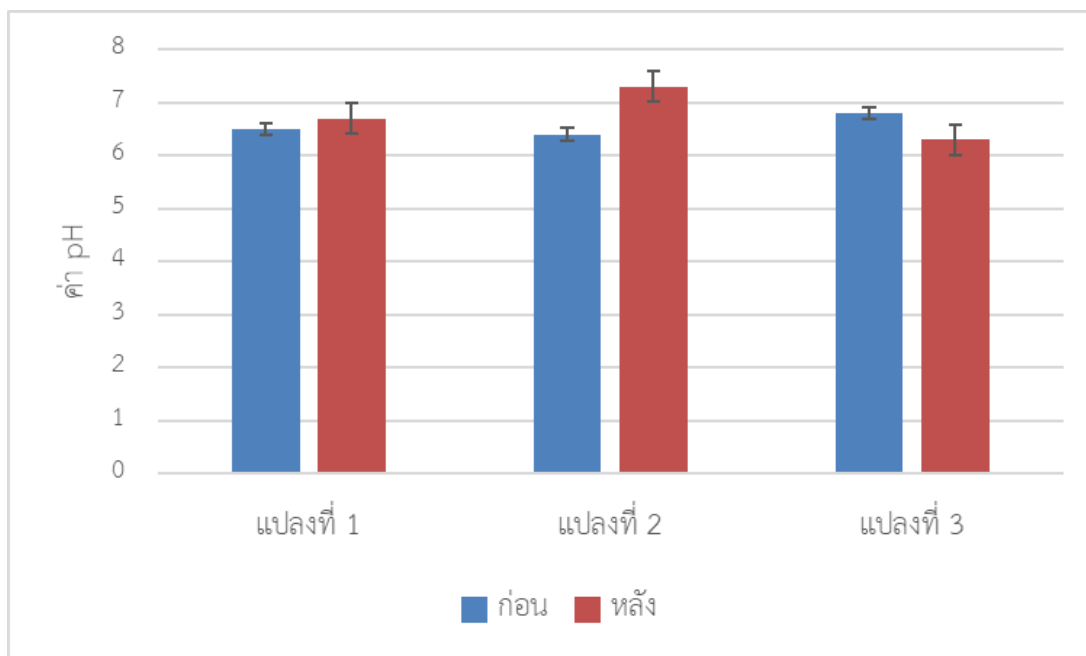
Picture 5 Shows pH value in both previous and after the experiment.

2.3 N P K

Study found that 1ˢᵗ plot (sandy soil) was the most fertile soil amongst the three plot and all N P K reduce after experiment. The other two plot having not much change due to poor seedling growth.
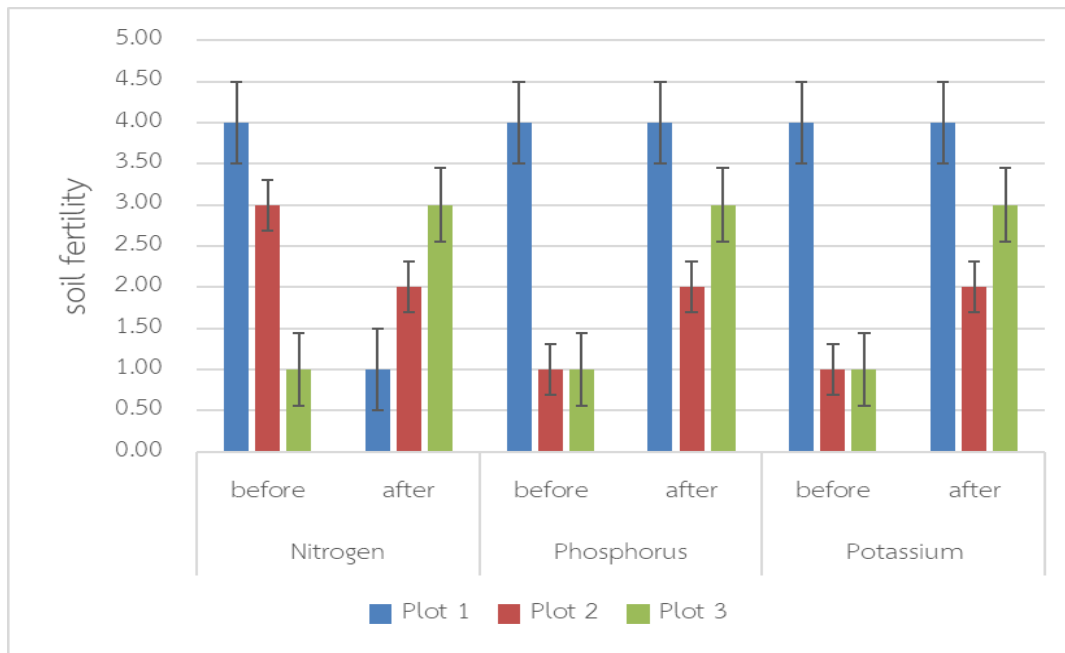
Picture 6 Shows the amount of Nitrogen, Phosphorus and Protasium before and after experiment.

2.4 Organic matter content

The study found that there was up and down of organic matter content before and after experiment. 1ˢᵗ and the other 2 plot gained organic matter after experiment where as 3ʳᵈ plot organic matter dwindled after experiment.
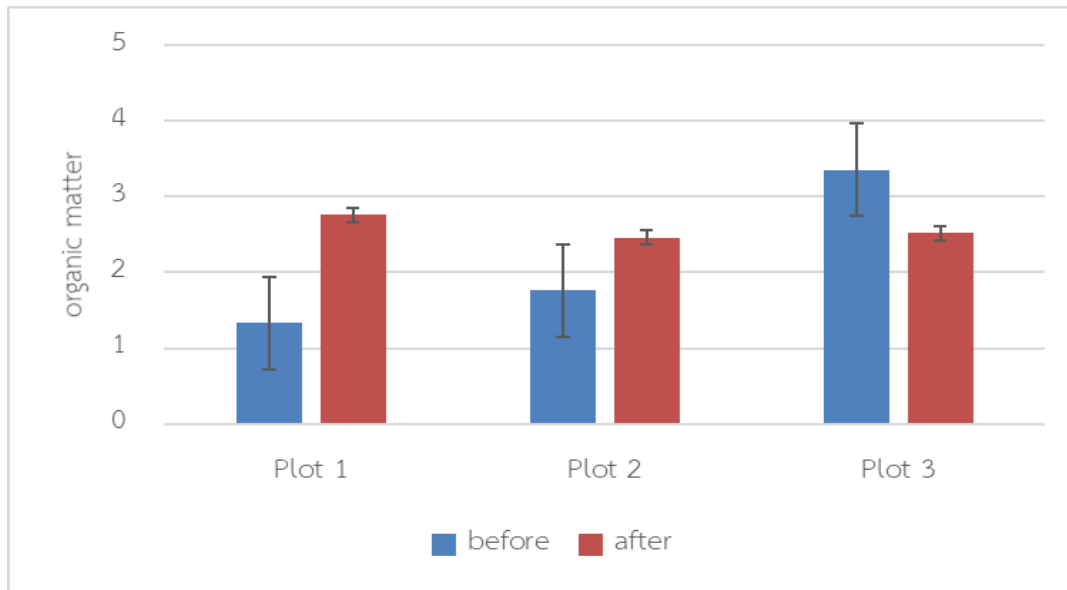
Picture 7 Shows organic matter before and after the experiment.

Conclusion

From study found that the growth of small leave mangrove was not significantly different in all three plots. Survival rate of the 1st plot found highest amongst the three, following by the 3th and 2th plot. Study of soil texture actually found that the 1st plot is sandy soil, 2nd plot is silt clay loam soil and the 3rd is sandy loam soil and there was no different in pH measurement of all three plots before and after experiment. NPK content in the 1st plot was found highest and dwindling after experiment. The other 2 plot result of NPK were no change due to poor seedling result. There were no significant different of growth result on shoot length and number of leave of all three kinds of soil, where as soil fertility does affect the survival rate as can be seen in the 1st plot.

I am a student researcher. I have used the research process to experiment with mangrove planting and study the quality of soil with measurement of GLOBE.

I am a collaboration. I do this research with two my friends. I survey of shoots and number of leaves were measuring once a week and last for 10 weeks. N P K, soil pH and organic matter were also measured before and after experiment.

I am a data scientist. When I got information about the length of shoot and the number of leaves at each study point. The data obtained will be averaged to study growth and using statistics to find out the soil quality of each area.

I make an impact. I studied about the useful of the mangroves and the mangrove forset area. I then pass on knowledge to all my friends in Banmodtanoy School. And campaign to reduce logging the mangroves. Help to plant more the mangroves together.

Acknowledgements

References

กรมทรัพยากรทางทะเลและชายฝั่ง.(2561). สถานการณ์ทรัพยากรป่าชายเลน จ.ตรัง.สืบค้น 24 ตุลาคม 2565 จาก https://km.dmcr.go.th/c_1/s_436/d_19150.

จักรกฤษณ์ จันทร์แฉล้ม, ธีรศักดิ์ อุ่นอารมณ์เลิศ. (2560). กระบวนการฟื้นฟูพื้นที่ป่าชายเลนเพื่อการพัฒนาที่ ยั่งยืน : กรณีศึกษาชุมชนต้นแบบบ้านเปร็ดในตำบลห้วงขาว อำเภอเมือง จังหวัดตราด.

ชัยสิทธิ์ ศิริตระกูลพาณิชย์ และคณะ.(2552). คู่มือการเพาะชำกล้าไม้ป่าชายเลน. สำนักอนุรักษ์ทรัพยากร ป่าชายเลน กรมทรัพยากรทางทะเลและชายฝั่ง : 6-12.

ราชบัณฑิตยสถาน.(2538). อนุกรมวิธานพืช อักษร ก ฉบับราชบัณฑิตยสถาน. กรุงเทพฯ: เพื่อนพิมพ์ : 405- 406.

สุบัณฑิต นิ่มรัตน์, ชุติมา กิติสาร และวีรพงศ์ วุฒิพันธุ์ชัย.(2558). ศึกษาการเจริญเติบโตของโกงกางใบใหญ่

        (*Rizophora mucronata*) จากมูลไก่อัดเม็ดและปุ๋ยฟอสเฟต. วารสารวิทยาศาสตร์มหาวิทยาลัย

        ขอนแก่น : 69 – 82.

สุริยะ ตาเตะ, สมภพ ยี่สุ่น.(2560). ผลของระดับความลึกที่แตกต่างกันของการปักชำฝักโกงกางใบเล็ก

        (*Rhizophora apiculata*) ลงดินต่อการเจริญเติบโตในเรือนเพาะชำ. สถาบันทรัพยากรธรรมชาติ

และสิ่งแวดล้อม มหาวิทยาลัยเทคโนโลยีราชมงคลศรีวิชัย วิทยาเขตตรัง.

Picture show Data Entry
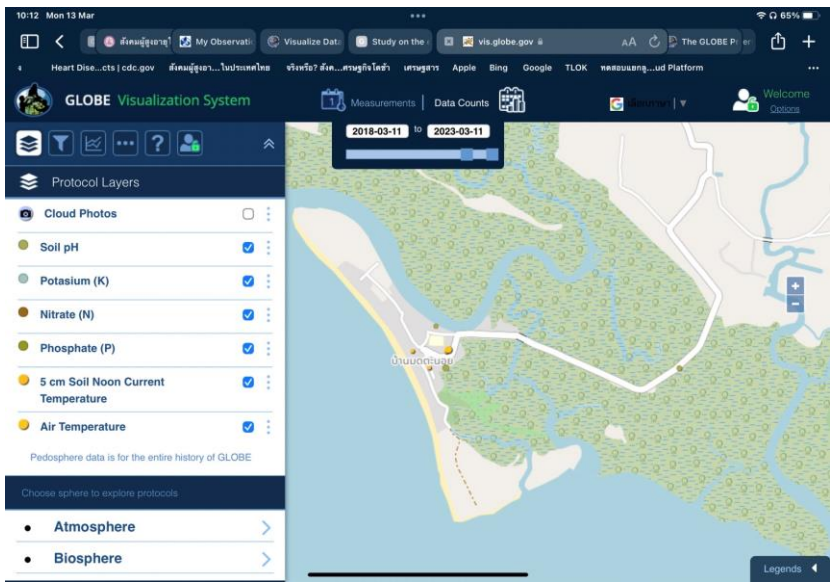
64 Observation(s) found.

Biometry - Vegetation Covers

Measured Date:	2023-02-28
Organization Name:	Banmodtanoy school
Site ID:	266164
Site Name:	47NNJ463077
Latitude:	7.306924
Longitude:	99.419467
Elevation:	6.5m
Measured On:	2023-02-28T05:42:00
GLOBE Teams:	GLOBE PCSHSTrang

🌐 Show on Map

Biometry - Vegetation Covers

Measured Date:	2023-02-28
Organization Name:	Banmodtanoy school
Site ID:	266164
Site Name:	47NNJ463077
Latitude:	7.306924
Longitude:	99.419467
Elevation:	6.5m
Measured On:	2023-02-28T05:44:00
GLOBE Teams:	GLOBE PCSHSTrang

🌐 THE GLOBE PROGRAM *SCIENCE Data Entry*

Welcome Punsaya
Trakunwatthana

Data Entry Home / Banmodtanoy school / mangrove cultivation / Soil pH

😊 Observation updated successfully. *Print this submission,* view observations or *create a new one.* ✕

Soil pH *Editing* ❓

* indicates required sections or fields

Horizon 1 (0cm - 5cm)
pH Method *

pH Meter ⇕

Sample 1
Soil pH *

6.5

❌ Remove Sample

Sample 2
Soil pH

6.5

❌ Remove Sample

Sample 3
Soil pH

6.5

❌ Remove Sample

Comments

Before planting mangroves

Horizon 2 (5cm - 8cm)
pH Method *

10:20 Mon 13 Mar ··· 📶 🎧 63% 🔋
◀ 📑 ◀ GLOBE Sc ❎ 🌐 data.globe.gov AA ↻ GLOBE Ob My Observ ⬆ +
◀ Heart Dise...cts | cdc.gov สังคมผู้สูงอา...ในประเทศไทย จริงหรือ? สังค...ศรษฎกิจโตช้า เศรษฐสาร Apple Bing ···

🌐 THE GLOBE PROGRAM *SCIENCE Data Entry*

Welcome Punsaya
Trakunwatthana

Data Entry Home / Banmodtanoy school / mangrove cultivation / Soil Fertility

Soil Fertility *Editing* ❓

* indicates required sections or fields

Horizon 1 (0cm - 5cm)
At least one sample is required. *

Sample1
Nitrate-Nitrogen

High ⇕

Phosphorus

High ⇕

Potassium

High ⇕

❌ Remove Sample

Sample2
Nitrate-Nitrogen

Medium ⇕

Phosphorus

None ⇕

Potassium

None ⇕

❌ Remove Sample

Sample3
Nitrate-Nitrogen

None ⇕

Phosphorus

None ⇕

Potassium

None ⇕