Research report

On studying the suitable mixed soil formula for the growth of chinese kale

Research

Miss Suchanan Thongnunui

Miss Natthayamon Sriphetr

Advisor

Ms.Khwanjai Karnchanasrimak

Ms.Adcharee Samhuy

Wichianmatu School Mueang District Trang Province Thailand

Research title: The research report on the study of soil blends suitable for the growth of Chinese kale

Research team: MissSuchanan Thongnunui MissNatthayamon Sriphetr

Grade Lavel: high school

Advisor: Ms. Khwanjai Karnchanasrimak Ms.Adcharee Samhuy

School: Wichienmatu Mueang District Trang Province

Abstract

The study of suitable soil for the growth of Chinese kale serves several purposes:

1. To examine the physical characteristics of the soil including its internal structure, color, texture, and pH levels suitable for Chinese kale cultivation.
2. To investigate the fertility of the soil for growing Chinese kale.
3. To compare soil qualities with the growth of Chinese kale.

Introduction

Soil is a natural substance resulting from the breakdown of rocks and various mineral elements, mixed with organic matter or organic substances derived from the decomposition of plant and animal residues until they become homogeneous. It serves as a medium for plant growth, but over time, there is a loss of mineral nutrients in the soil. Therefore, it is necessary to study soils from the same source with different soil compositions. Soils mixed with cow manure, chicken manure, and chemical fertilizers vary in each plot. This is to observe the growth of Chinese kale in each plot.

The purpose of the research project

Study the physical characteristics of the soil, including its structure, color, texture, pH level, mineral composition, and temperature suitable for growing Chinese kale. Compare soil quality with the growth of Chinese kale.

Research questions

The physical characteristics of the soil soil structure soil color soil texture pH level temperature and mineral composition; are there differences in fertility among the different plots?

Hypothesis of the research

The soil mixed in three formulas: Formula 1 with chemical fertilizers Formula 2 with chicken manure and Formula 3 with cow manure have different effects on growth.

Materials and Equipment and Research Procedures

1. Equipment for soil sample collection.
2. Soil structure sample image plate.
3. Equipment for measuring soil color.
4. Water sprayer.
5. Soil color comparison book.
6. Soil samples.
7. Soil pH testing manual.
8. pH paper or pH pen or pH meter.
11. Distilled water.
12. Glassware.
13. Equipment for soil sample preparation.
14. Dried and sieved soil samples.
15. Soil fertility testing kit to determine the N, P, and K values of the soil.
18. Place for petri dishes or test tubes.
19. Thermometer.

Setting Study Points.

Soil in Plot 1 (cow manure), soil in Plot 2 (chicken manure), and soil in Plot 3 (chemical fertilizer).

Research Procedure

1. Preparation stage.

1) Set the research agenda by selecting the topic of study.

2) Conduct research and gather knowledge and theories related to the research work.

3) Define the objectives of the study.

4) Determine the sampling points for data collection within the study area.

2. Implementation phase.

1) Plan the research operations.

2) Conduct a survey of the research area.

3) Collect samples for measurement, focusing on factors pertinent to the study such as geographical coordinates, soil physical properties, soil structure, soil color, soil texture, soil temperature, soil mineral composition, pH levels, and soil fertility.

The soil sampling

1) Soil structure measurement method

Collect soil samples using various methods for studying soil characteristics, record preliminary data, measure size, shape, and record data on a data recording sheet for soil characteristic measurements. Frequency of data collection: once at each study point.

2)Soil color measurement method

Pick soil aggregates from each soil layer sample for observation and record on the data sheet whether the soil aggregates are moist, dry, or wet. If dry, moisten slightly with water from a prepared bottle. Split the soil aggregates into two parts. Stand under sunlight and compare the soil color book with the soil sample being measured. Record the soil color value on the data sheet.

3)Soil texture inspection method

Use soil structure sample image sheets to inspect soil texture.

4)pH measurement method

Prepare the soil samples by drying and sieving. Weigh 20 grams of the dried and sieved soil sample, add distilled water (20 or 100 milliliters) to achieve a soil-to-water ratio of 1:1. Stir the soil-water mixture using a glass rod for 30 seconds, then let it settle for 3 minutes. Repeat this process 5 times. After the fifth stirring, allow the mixture to settle until the soil in the beaker settles. Clear water will be visible on top. Dip a pH meter or pH test strip calibrated to standard values into the clear water area without touching the soil at the bottom. Wait until the pH reading stabilizes, then record the pH value.

5) Method for measuring soil fertility

Weigh 20 grams of dried and sieved soil sample into a beaker. Add distilled water (20 or 100 milliliters) to achieve a soil-to-water ratio of 1:1. Stir the soil-water mixture using a glass rod for 30 seconds, then let it settle for 3 minutes. Repeat this process 5 times. After the fifth stirring, allow the mixture to settle until the soil in the beaker settles. Clear water will be visible on top. Use a pipette to extract 2.5 milliliters of soil solution into a test tube. Add 1 packet of HI 3895-N reagent to the soil solution. Close the test tube lid and shake for approximately 30 seconds to dissolve the chemicals. Then compare the pink color that appears on the nitrate comparison disk. Use a pipette to extract 2.5 milliliters of soil solution into a test tube. Add 1 packet of HI 3895-P reagent to the soil solution. Close the test tube lid and shake for approximately 30 seconds to dissolve the chemicals. Then compare the blue color that appears on the phosphate comparison disk. Use a pipette to extract 0.5 milliliters of soil solution into a test tube. Add distilled water to make a total volume of 2.5 milliliters. Add 1 packet of HI 3895-K reagent to the soil solution. Close the test tube lid and shake for approximately 30 seconds to dissolve the chemicals. Then compare the turbidity that appears on the potassium comparison disk.

6) Temperature Inspection

Use a thermometer to measure soil temperature, measuring three times per plot. Then record the results of each measurement for each plot.

3. Analysis and Summary of Research Findings

1) Analyze and compare the data obtained, utilizing statistical methods for data analysis, including soil physical properties, soil structure, soil color, soil texture, average pH value, soil mineral composition, temperature average, and soil fertility

2) Create bar charts to compare average data.

3) Summarize the experimental results.

Research findings

Geographical coordinates Conducted soil study in Plot 1 (cow manure), Plot 2 (chicken manure), and Plot 3 (chemical fertilizer), with each plot having coordinates as listed in Table 1.

Table 1: Geographical Coordinates

Area	Geographical coordinates	
	Latitude (N)	Longitude (E)
Soil in Plot 1 (cow manure)	7.314984	99.704001
Soil in Plot 2 (chicken manure)	7.314984	99.704001
Soil in Plot 3 (chemical fertilizer)	7.314984	99.704001

In summary from Table 1, the geographical coordinates of the soil in Plot 1 (Cow Manure), Plot 2 (Chicken Manure), and Plot 3 (Chemical Fertilizer) have a latitude of 7.314984 and a longitude of 99.704002.

Table 2: Physical Characteristics of Soil

Area	Soil structure	Soil color	Soil texture	picture
Soil in Plot 1 (cow manure)	Individual grains/particles	Brown color	Clay loam soil mixed with sand	
Soil in Plot 2 (chicken manure)	Individual grains/particles	Brown color	Clay loam soil mixed with sand	
Soil in Plot 3 (chemical fertilizer)	Individual grains/particles	Brown color	Clay loam soil mixed with sand	

In summary from Table 2, the physical characteristics of the soil in Plot 1 (Cow Manure), Plot 2 (Chicken Manure), and Plot 3 (Chemical Fertilizer) show a granular structure with a brown color, and the soil texture is loamy with sandy components.

Table 3: Soil pH Values

Area	1st time	2nd time	3rd time	average
Soil in Plot 1 (cow manure)	7	6.5	6.5	6.67
Soil in Plot 2 (chicken manure)	7	6.5	6.5	6.67
Soil in Plot 3 (chemical fertilizer)	7	6.5	6.5	6.67

In summary from Table 3, the pH values in the soil of Plot 1 (Cow Manure), Plot 2 (Chicken Manure), and Plot 3 (Chemical Fertilizer) have an average value of 6.67.

Table 5: Soil Temperature

Area	1st time	2nd time	3rd time	average
Soil in Plot 1 (cow manure)	28 °c	27 °c	27 °c	27.33 °c
Soil in Plot 2 (chicken manure)	27 °c	26 °c	26 °c	26.33 °c
Soil in Plot 3 (chemical fertilizer)	29 °c	28 °c	28 °c	28.33 °c

In summary from Table 4, the soil temperature in Plot 1 (Cow Manure) has an average value of 27.33 degrees Celsius, in Plot 2 (Chicken Manure) it is 26.33 degrees Celsius, and in Plot 3 (Chemical Fertilizer) it is 28.33 degrees Celsius.

Table 4: Soil Fertility

Area	N	P	K
Soil in Plot 1 (cow manure)	medium	trace	trace
Soil in Plot 2 (chicken manure)	medium	high	trace
Soil in Plot 3 (chemical fertilizer)	low	low	trace

In summary from Table 5, it is found that the fertility, N content in Plot 1 (Cow Manure) is medium, in Plot 2 (Chicken Manure) it is high, and in Plot 3 (Chemical Fertilizer) it is low. The P content in Plot 1 (Cow Manure) is trace, in Plot 2 (Chicken Manure) it is high, and in Plot 3 (Chemical Fertilizer) it is low. The K content in Plot 1 (Cow Manure), Plot 2 (Chicken Manure), and Plot 3 (Chemical Fertilizer) is trace.

Table 6: Characteristics of Vegetable Plots

Area	picture
Soil in Plot 1 (cow manure)	
Soil in Plot 2 (chicken manure)	
Soil in Plot 3 (chemical fertilizer)	

In summary, based on Table 6, the growth of Chinese kale is observed as follows: in Plot 1 (Cow Manure), the growth score is 9; in Plot 2 (Chicken Manure), it is 8; and in Plot 3 (Chemical Fertilizer), it is 5.

Research Summary and Discussion of Results

From the experiment studying the suitable soil mixtures for the growth of Chinese kale, it was found that in terms of physical characteristics, the soil in Plot 1 (cow manure), Plot 2 (chicken manure), and Plot 3 (chemical fertilizer) had a single-grain structure, brown color, and loamy soil with sandy clay. The pH values of the soil in Plot 1 (cow manure), Plot 2 (chicken manure), and Plot 3 (chemical fertilizer) had an average value of 6.67. Additionally, the soil temperature in Plot 1 (cow manure) had an average value of 27.33 degrees Celsius, Plot 2 (chicken manure) had an average value of 26.33 degrees Celsius, and Plot 3 (chemical fertilizer) had an average value of 28.33 degrees Celsius. Furthermore, the soil fertility, nitrogen (N) content in Plot 1 (cow manure) and Plot 2 (chicken manure) was moderate, while in Plot 3 (chemical fertilizer) it was low. The phosphorus (P) content in Plot 1 (cow manure) was very low, in Plot 2 (chicken manure) it was high, and in Plot 3 (chemical fertilizer) it was low. The potassium (K) content in Plot 1 (cow manure), Plot 2 (chicken manure), and Plot 3 (chemical fertilizer) was very low. It was also observed that the growth of Chinese kale in Plot 1 (cow manure) scored 9, in Plot 2 (chicken manure) scored 8, and in Plot 3 (chemical fertilizer) scored 5.

Discussion of Independence

The researchers would like to express their gratitude to Teacher Kwanjai Kanjansrimet and Teacher Atchariya Samhui for their knowledge and providing the facilities for data collection. Special thanks to Teacher Kwanjai Kanjansrimet and Teacher Atchariya Samhui for their guidance as environmental research advisors, providing valuable advice and information for the research. Also, thanks to friends who assisted in environmental research.

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