

Title: Comparing the quality of soil with different ratios in manure that affect the growth of pea trees

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### Abstract

Environmental Science Subject: Comparing the quality of soil with different ratios in manure that affect the growth of peanuts

Objectives

1. To compare the quality of the soil in the area where the pea tree is planted with the addition of cow manure, chicken manure, cow dung mixed with chicken manure.
2. To compare the growth of pea trees with the addition of cow manure, chicken manure, cow manure mixed with chicken manure.

By conducting a study of measurement, measuring moisture values. Measure acidity-base  
Measure N P K Soil Quality with Different Types of Manure and Growth of Nut Trees

The study found that a comparison of the use of three types of manure, cow manure (C), chicken manure (H), and mixed manure (CH), in a given ratio found that: Growth aspect: Each type of manure affects the height and growth of pea trees differently. According to the growth

graph (Figure 1), the group using mixed manure (CH) and chicken manure (H) tended to increase height better and more stable than cow manure alone in some sets of soil quality experiments. (pH and NPK): The use of manure helps to normalize the acid-alkalinity (pH) of the soil (around 6-7, which is a neutral to mildly acidic level) and helps to increase macronutrients such as nitrogen (N), phosphorus (P), and potassium (K), which are essential for chlorophyll formation and stem expansion.

Environmental factors: Soil moisture and light intensity also have an impact by controlled humidity to allow for efficient absorption of nutrients from manure.

**Keywords** Peanut tree, soil quality, fertilizer ratio, peanut tree growth

### Origin and importance of education

Anchan (*Clitoria ternatea* L.) is a medicinal plant native to the tropics and is common in Thailand. It is classified as a legume with a variety of values and benefits, especially pea flowers, which contain a high amount of anthocyanins. The substance has antioxidant properties, reduces the risk of developing various diseases, and also plays an important role in promoting health. For this reason, peanuts have gained popularity in the food industry. Herbal drinks This is in line with the trend of consumer demand that is more important to safety and health.

At present, many farmers prefer to use chemical fertilizers in their crop cultivation because they can accelerate plant growth and yield in a short period of time. However, the continuous use of chemical fertilizers for a long time may have negative impacts on soil quality, such as deterioration of soil structure, soil density, lack of organic matter, and reduced water holding capacity.

For this reason, the use of organic fertilizers is another approach that is receiving more attention. In particular, manure, which is an organic fertilizer that can be easily obtained in the community, has a low cost and is environmentally friendly. Manure has the property of increasing organic matter in the soil, making the soil have a loose structure, suitable for the growth of plant roots, and also promotes the activity of microorganisms in the soil, which plays an important role in decomposing organic matter and releasing nutrients for plants to use effectively.

Therefore, the organizers recognized the importance of studying the use of manure by focusing on comparing the ratios and types of cattle manure differently. To study how these factors affect the growth of pea trees in various aspects such as plant height, number of leaves, stem integrity, and plant flowering. This study not only helped to obtain academic information on the proper use of manure. But the results can also be applied as a guide to reduce the use of chemical fertilizers. Reduce production costs Increase the quality of produce and promote sustainable agriculture, which will benefit farmers. The community and the environment in the long term.

### **Research Questions**

1. The quality of the soil at the planting area of the pea tree with the addition of cow manure, chicken manure, cow manure mixed with chicken manure. Is there a difference?
2. Growth of pea trees with the addition of cow manure, chicken manure, cow dung mixed with chicken manure. Is there a difference?

### **Research Hypothesis**

1. The quality of the soil at the Tan Anchan planting area with the addition of cow manure, chicken manure and chicken manure mixed with chicken manure are different.
2. The growth of pea trees with the addition of cow manure, chicken manure, cow dung mixed with chicken manure is different.

### **Materials and equipment for conducting research**

1. Beaker 6. Glass Petri Dish
2. Stirring Rod 7. Filter Papers
3. Glass funnel 8. Distilled water
4. Fertilizer meter N P K
5. Tape Measure 9. Universal Indicator

### **How the research was conducted**

Hypothesis 1: To compare the quality of the soil in the area where the pea tree is planted with the addition of cow manure, chicken manure, cow manure mixed with chicken manure.

The soil in the planting area where each type of manure is added is chicken manure/cow manure/and mixed cow manure.

The variable according to the quality of the soil to which each type of manure is added is chicken manure/cow manure/and mixed cow manure.

Control variable: the size of the pot. Nitrogen phosphorus measurement date Potassium pH  
Measurement Instruments

Hypothesis 2: To compare the growth of pea trees with the addition of cow manure, chicken manure, cow dung mixed with chicken manure.

Early variant: Saplings of the pea tree

The variants based on the growth of the pea tree with the addition of each type of manure are chicken manure/cow manure/and mixed cow manure.

Control variables, soil, water, ratio of the paddock, switching meters used to measure the height of the plant. Equipment: Beakers, soil containers, stirring glass sticks, filter paper, cones, distilled water, universal indicator paper, pink ball bottles, nitrogen, phosphorus, potassium meters and tape measure

## Part 1

To study the ratio of different types of manure affecting soil quality.

1.1 Measurement of acidity and base of soil scoop from 2 tbsp. Put it into the beaker, fill it with 40ml of distilled water, use a glass stick, stir the substance should be well and pile the clay solution with the pile paper through the squeeze into the pink ball bottle, after taking the universal indicator paper dipped in the soil solution to compare the color with the color strip of the paper. Universal Indicator conducted 3 experiments. After that, save the result to the table.

## 1.2 Measurement of nutrient content in soil

Take the N P K detector and pin it deep at the base of the tree. After that, wait for about 3 to 5 minutes and read the value on the meter to record the result.

## Part 2

### 2.1 Soil Moisture Measurement

The soil moisture value of each pot is measured using an automatic meter, the head of the meter is placed at the base of the bean plant, waited for 3 to 5 minutes, and then the meter screen reading was recorded.

## Part 3

To study the growth of the pea tree.

### 3.1 Planting of pea trees

Select a sapling of a well-rounded anchan tree of similar size and plant it in pots. Prepare the soil mixed with each type of manure using all pots of the same size.

### 3.2 Care of the anchan tree

Place the pots in a similar area to get things in a similar environment, watering daily at 7 a.m. and 3 p.m. not adding additional fertilizer for the duration of the experimental study.

### 3.3 Measurement of the growth of the nut tree

The height of the bean tree was measured from the base to the tip of the shoot using a tape measure and the results were recorded once a week throughout the experiment period.

## Research Results

A study comparing the quality of soil with different ratios of manure that affects the growth of anchan trees has been studied.

## Geographical coordinates

area	Geographic coordinates	Geographic coordinates
	Latitude (N)	Longitude (E)
Butterfly pea plant pot	7.50451	99.62862

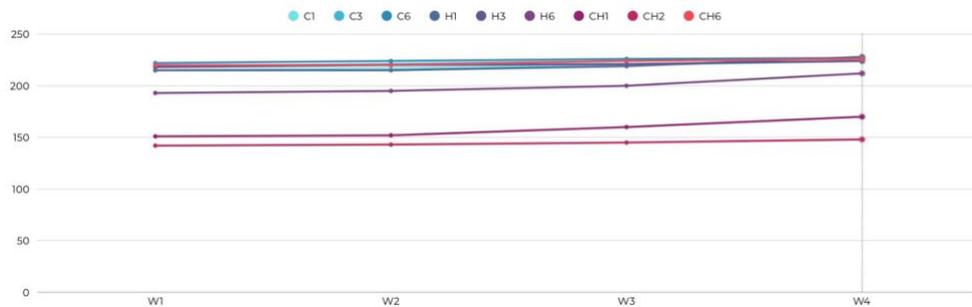
Displays the geographical coordinates of the anchan tree.

C1=1st sack of cow manure, C3=3rd sack of cow manure, C6=6th sack of cow manure.

H1= 1st sack of chicken droppings, H3 = 3rd bag of chicken droppings, H6= 6th bag of chicken droppings

CH1= Cow manure mixed with chicken manure sack 1 , CH3 = cow manure mixed with chicken manure sack 3 , CH6 = cow manure mixed with chicken manure sack 6

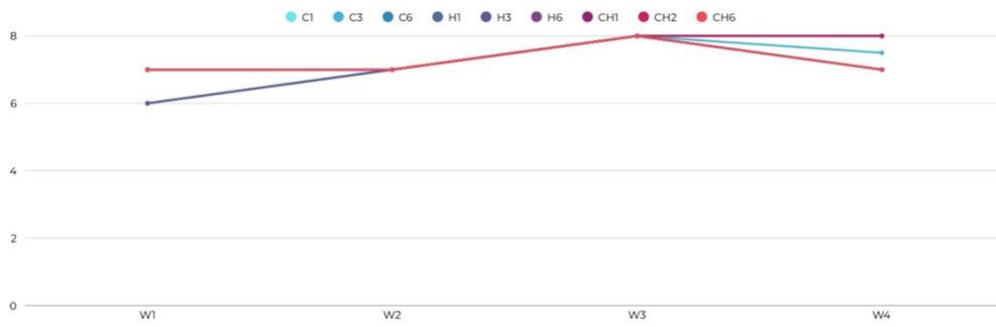
Picture 1 Growth Line Chart



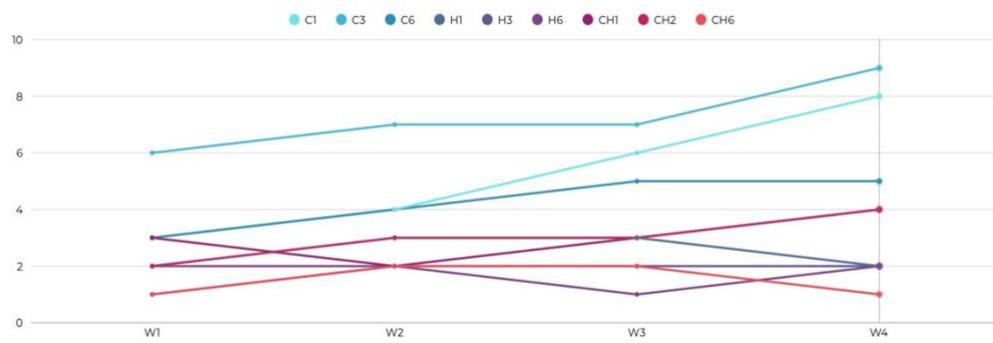
Picture 2 Humidity Line Chart



Picture 3 Line chart showing acidity-base value



Picture 4 Line chart showing the nitrogen value in the soil.

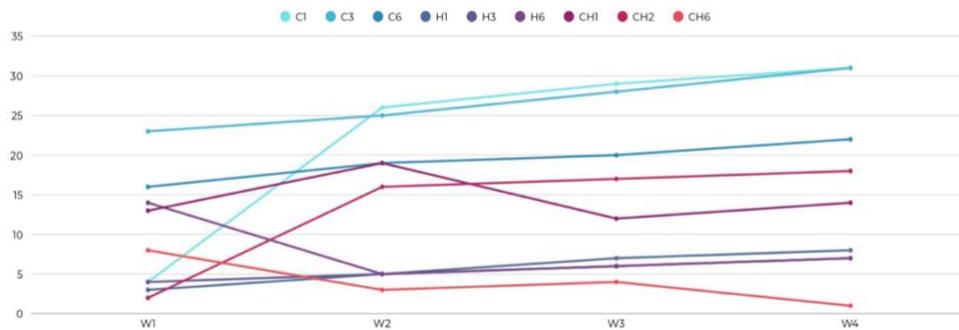


Picture 5 Line chart showing phosphorus values in the soil.

Picture 6 Line chart showing potassium in soil.

## Conclusions

According to a comparative experiment using 3 types of manure, cow manure (C), chicken manure (H), and mixed manure (CH) in a given ratio, it was found:



Growth aspects: Each type of manure affects the height and growth of the pea plant differently.

According to the growth graph (Figure 1), the group using mixed manure (CH) and chicken manure (H) tended to increase height better and more stable than cow manure alone in some of the experiments.

Soil quality (pH and NPK): The use of manure helps to adjust the acidity-alkalinity (pH) of the soil to the optimal range (around 6-7, which is a neutral to mildly acidic level) and helps to increase macronutrients such as nitrogen (N), phosphorus (P), and potassium (K), which are necessary for chlorophyll formation and stem expansion.

Environmental factors: Soil moisture and light intensity also have an impact. Controlled humidity allows for efficient absorption of nutrients from manure.

## Discussion of the results

Efficiency of chicken manure and mixed manure: The reason why chicken manure has a positive effect on growth may be because chicken manure contains more nutrients, especially

nitrogen and phosphorus, than cow manure. When mixing (mixed manure), the soil has a richer and more complete range of nutrients.

pH adjustment: from the pH graph (Figure 4), it can be seen that in the last weeks, the pH value has become more stable, reflecting that the microorganisms in the manure help to decompose organic matter and balance the soil, which directly affects the solubility of nutrients for plants to use.

Relationship of humidity and light: despite the control of external factors, from the humidity (photo 2) and light (photo 3) graphs there is a fluctuation. It shows that the anchan has a response to the weather on a daily basis. However, the continued increase in growth suggests that "manure soil nutrients" are the main factor that supports growth despite climate change.

### **Additional Suggestions**

1. There should be additional measurements of the number of leaves or the diameter of the stem to show the integrity of the pea tree in a variety of dimensions rather than height alone.
2. Increase the education area.

### **Acknowledgments**

The study on the comparison of soil quality with different ratios of manure that affects the growth of pea trees was successfully completed. The organizer would like to thank you.

Dr. Apirak Songrak for providing knowledge about the Anchan tree and thanking him. Teacher Kwanjai Kanchan Srimek as a consultant gave advice on the preparation and provided information on the preparation very well. Thank you to my team members for their assistance in this independent study.

### **References**

Academic Institute on Organic Fertilizer and Utilization in Thailand by the Department of Land Development

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[5YS1eK4mE\\_aem\\_I65DGQGu6jYUGYV1dJcfrA&h=AT2EC2O0RCrT9ulMbVmdqtpSKDXa8gTNZgoof8g0Ottbd9loynP9MxtUI5Kjf6ABvvdK69qwHS2Y8u7SQdiStrfLOR7iHsXNWe1-MysErvT0eElHHiZUpgiU0a-4mgl&s=1](https://www.facebook.com/l.php?u=https%3A%2F%2Fwww.doa.go.th%2Fhc%2Floi%2Fwp-content%2Fuploads%2F2024%2F11%2F%25E0%25B8%2584%25E0%25B8%25B9%25E0%25B9%2588%25E0%25B8%25A1%25E0%25B8%25B7%25E0%25B8%25AD%25E0%25B8%25AD%25E0%25B8%25B1%25E0%25B8%258D%25E0%25B8%258A%25E0%25B8%25B1%25E0%25B8%258D-4.pdf%3Ffbclid%3DIwZXh0bgNhZW0CMTEAc3J0YwZhchBfaWQPNDM3Njl2MzE2OTczNzg4AAEeCbelRC_IcBXW-FOBrmJRrhO23a-Y6H02AV0DhDwG4HY3mWt5mJac-LO104_aem_DxdW7LYO-vhWAPM0-l7cGg&h=AT3SIfHdqYrdhBxB-1TBsCkiaR_n8rHNKOe5_w_F8cN1fVwjIFCksrfbB-R_k0BR8lyF2qvUQLaxMMqa2k2Wc4IpcqATwmqvdYRJpv-ssY7U2sQUvoxfsMCeeEur6rM&s=1)

The Department of Agriculture's manual for the production of medicinal plants by the Department of Agriculture.

[https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.doa.go.th%2Fhc%2Floi%2Fwp-content%2Fuploads%2F2024%2F11%2F%25E0%25B8%2584%25E0%25B8%25B9%25E0%25B9%2588%25E0%25B8%25A1%25E0%25B8%25B7%25E0%25B8%25AD%25E0%25B8%25AD%25E0%25B8%25B1%25E0%25B8%258D%25E0%25B8%258A%25E0%25B8%25B1%25E0%25B8%258D-4.pdf%3Ffbclid%3DIwZXh0bgNhZW0CMTEAc3J0YwZhchBfaWQPNDM3Njl2MzE2OTczNzg4AAEeCbelRC\\_IcBXW-FOBrmJRrhO23a-Y6H02AV0DhDwG4HY3mWt5mJac-LO104\\_aem\\_DxdW7LYO-vhWAPM0-l7cGg&h=AT3SIfHdqYrdhBxB-1TBsCkiaR\\_n8rHNKOe5\\_w\\_F8cN1fVwjIFCksrfbB-R\\_k0BR8lyF2qvUQLaxMMqa2k2Wc4IpcqATwmqvdYRJpv-ssY7U2sQUvoxfsMCeeEur6rM&s=1](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.doa.go.th%2Fhc%2Floi%2Fwp-content%2Fuploads%2F2024%2F11%2F%25E0%25B8%2584%25E0%25B8%25B9%25E0%25B9%2588%25E0%25B8%25A1%25E0%25B8%25B7%25E0%25B8%25AD%25E0%25B8%25AD%25E0%25B8%25B1%25E0%25B8%258D%25E0%25B8%258A%25E0%25B8%25B1%25E0%25B8%258D-4.pdf%3Ffbclid%3DIwZXh0bgNhZW0CMTEAc3J0YwZhchBfaWQPNDM3Njl2MzE2OTczNzg4AAEeCbelRC_IcBXW-FOBrmJRrhO23a-Y6H02AV0DhDwG4HY3mWt5mJac-LO104_aem_DxdW7LYO-vhWAPM0-l7cGg&h=AT3SIfHdqYrdhBxB-1TBsCkiaR_n8rHNKOe5_w_F8cN1fVwjIFCksrfbB-R_k0BR8lyF2qvUQLaxMMqa2k2Wc4IpcqATwmqvdYRJpv-ssY7U2sQUvoxfsMCeeEur6rM&s=1)