Research

Study of factors affecting Molineria latifolia Herb in Palian District,Trang Province

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abstract

This project aimed to study the growth factors of Hill coconut in Palian District, Trang Province. The study involved analyzing soil quality from six different locations in the area, examining soil properties and growth factors such as soil moisture, air humidity, soil temperature, soil pH, and light intensity at various times. The survey also included counting the number of plants per unit area, revealing a density range of 25 plants/m^2. in low-density areas and 63 plants/ m^2. in high-density areas. The light intensity ranged from 741-4449 LUX, indicating low light conditions. Humidity levels were high, ranging from 83-87%, and soil temperature ranged from 26.5-27.5 degrees Celsius. The findings suggest that Molineria nutans grows better in low-density areas compared to high-density areas, and soil fertility does not appear to significantly affect the growth of Hill coconut.

Keywords:Coconut (NokKum variety)Growth

Introduction

Hill Coconut, Lumbah (scientific name Molineria latifolia Herb. ex Kurz) is also known as Wan Prao Nok Kum, Wan Sak Lek, and Jalan Prao Nok. It is a herbaceous plant resembling those in the palm family. The base of the plant is wide and covers the stem. It is a native plant of southern Thailand. The ripe fruit has a sweet taste and is mostly found in rubber plantations.

Nok Kum coconut is a small herbaceous plant, similar in appearance to a palm but only reaching knee height or slightly taller. The fruit grows at the base of the plant close to the ground, in clusters resembling bunches. The ripe fruit is about the size of a little finger, with a white color tinged with red. When ripe, it easily detaches from the stem.

Its medicinal properties include purifying the blood, relieving coughs, sore throats, joint pain, reducing heat toxicity, and alleviating fever. The fresh leaves of Wan Sak Lek can be boiled in water and consumed to treat uterine inflammation, prolapse, and menstrual pain. It helps to reposition the uterus, correct uterine abnormalities, and reduce bruising.

To use, take the roots, slice thinly, and dry them. The flowers can be consumed with alcoholic beverages. For treating bruises, use dried roots, ground into a powder, 10 grams at a time, brewed with warm water for drinking. To treat acne, blemishes, and dark spots, use the root and rub it on the affected area..

Research objectives

1.To study the growth of Hill coconut , at Ban Lam Khlaeng, Pa Lian Subdistrict, Pa Lian District, Trang Province.

2. To analyze the growth factors of dwarf coconut, including soil moisture, relative air humidity, soil temperature, soil minerals, soil pH, and light intensity.

Research Questions

1. Do different environments affect the growth of Hill coconut, How?

2. Does the different density of Hill coconut growth areas affect their growth, How?

Research Hypotheses

1. Different environments affect the density and growth of Hill coconut

2. Plant density affects the growth of individual plants.

Materials and Equipment

-Beaker

-Distilled Water

-Stirring rod

-Compact scale

-Funnel glass

-6 soil sampling points

-Thermometer

-Soil meter

-Relative Humidity meter

-LUX light meter

-pH paper

measurement

-Pedosphere Soil

-Atmosphere

-light intensity

-biosphere studies

Set sampling points

The study was conducted in Ban Lam Khlaeng Village, Pa Lian Subdistrict, Pa Lian District, Trang Province, to investigate the growth factors of Hill coconut. Within each area, study sites were determined based on density, using a sampling area of 50 × 50 centimeters. Soil samples were collected from both high-density and low-density areas, with a total of 6 sampling points: 3 points from high-density areas and 3 points from low-density areas.

research methodology

1.Research Preparation Steps

The growth factors of Hill coconut in Ban Lam Khlaeng Village, Pa Lian Subdistrict, Pa Lian District, Trang Province, were studied. A sampling area of 50 × 50 centimeters was defined to determine density. Soil samples were collected from both high-density and low-density areas, with a total of 6 sampling points 3 points from high-density areas and 3 points from low-density areas.

2. Literature Review and Theory Gathering

-Principles of light intensity measurement

-Principles of soil moisture measurement

-Relative air humidity

-Principles of soil pH measurement

-Principles of soil temperature measurement

-Principles of soil N-P-K measurement

3. Setting Study Objectives

-To study the growth of Hill coconut.

-To analyze the suitability of soil for growing Hill coconut.

-To develop effective maintenance practices for Hill coconut.

4. Setting Sampling Points in the Study Area

Soil samples were collected from areas within the palm plantation where Hill coconut were growing. Sampling was conducted in each area, using a 50 × 50 cm sampling area, with

a total of 6 sampling points 3 points from high-density areas and 3 points from low-density areas.

2. Research Implementation

1. Soil Temperature Measurement

-Use a pilot stick to create a hole approximately 10-20 centimeters deep.

-Insert a temperature thermometer into the prepared hole and wait for 1 minute to allow the temperature to stabilize. Record the first temperature reading.

-Record the second temperature reading. Take only two temperature measurements.

2. Soil Moisture Measurement

-Use a pilot stick to create a hole approximately 10-20 centimeters deep.

-Insert a soil moisture meter into the prepared hole, wait for 1 minute, and record the first moisture reading.

-Record the second moisture reading. Take only two moisture measurements.

3. Relative Air Humidity Measurement

-Use a digital hygrometer for measurement.

-Measure at each study point and record the reading directly from the meter. One measurement per point.

4. Soil pH Measurement

-Weigh 20 grams of dried and sieved soil sample and pour it into a beaker.

-Add 20 milliliters of distilled water to achieve a soil-to-water ratio of 1:1.

-Stir the soil with a glass rod for 30 seconds and let it rest for 3 minutes. Repeat this 5 times.

-After the 5th repetition, let the soil settle until the water becomes clear on top.

-If the water is not clear, use filter paper to separate the water from the soil.

-Dip a pH test strip into the water, wait for the reading to stabilize, and record the pH value.

5. Soil Nutrient Measurement

-Weigh 50 grams of soil sample and pour it into a beaker.

-Add 50 milliliters of distilled water to achieve a 1:1 ratio.

-Stir the soil with a glass rod for 30 seconds and let it rest for 3 minutes. Repeat this 5 times.

-Dip an N-P-K meter into the soil solution, wait for the readings to stabilize, and record the N, P, and K values.

Analysis and Conclusion of Research

1.The collected data was analyzed and compared for correlations using statistical methods.

Including Soil temperature ,Relative air humidity, Average soil pH ,Average soil moisture, Light intensity, Average soil nitrogen (N), Average soil phosphorus (P), Average soil potassium (K)

2. Creating Graphs to Display Average Data for Comparison

Research Results

geographic coordinate system Research on the area of Ban Lam Khlaeng Village, Pa Lian Subdistrict, Pa Lian District, Trang Province.

The coordinates are listed in Table 1.

Table 1 Geographic Coordinates

Zone	geographic coordinate	
	Latitude (N)	Longitude (E)
Ban Lam Khlaeng	7.310719	99.843582

Table 2 Soil Sampling Period

Times	Soil Sampling Period	
	Day/Month/Year	Time
1	2 August 2024	10.00 น.
2	22 December 2024	10.00 น.

Image 1 illustrates the map of soil sampling locations at Pa Lian Subdistrict, Pa Lian District, Trang Province.

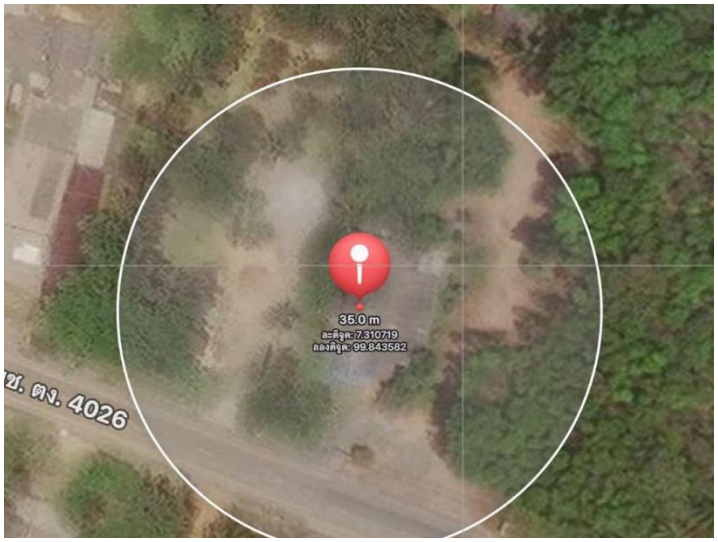

Table 3 Plant density

density	Plant density / m^2
Low-density	25
High- density	63

This table shows the number of Hill coconut per 1 m^2, divided into 2 levels of density low density 25 trees/m^2 and high density 63 trees/m^2

Table 4 Biological Properties of Hill Coconut

Low-density (average)					
Point	**Leaf count (Leaf)**	**Trunk circumference(cm)**	**Trunk length (cm)**	**Leaf size (cm)**	**Length of leaf (cm)**
1	4	3.25	17.5	5.07	23.25
2	5	12.62	18.62	7.17	39.5
3	5	13.62	25	8.12	42.25
Average	4	9.83	10.37	6.79	35
High- density (average)					
Point	**Leaf count (Leaf)**	**Trunk circumference(cm)**	**Trunk length (cm)**	**Leaf size (cm)**	**Length of leaf (cm)**
4	5	24.5	6.62	6.25	71.75
5	2	2.25	8.5	12	9
6	4	3	7.25	7	12
Average	3	7.36	7.46	8.42	33.5

The table shows that areas with lower Hill coconut tree density exhibit better growth, resulting in larger biological characteristics such as trunk size, trunk length, leaf size, and leaf length compared to areas with higher density.

Table 5 Soil Structure

Low-density				
Point	**Measured values**			
	Soil Consistence	**Soil Color**	**Soil Texture**	**acid-base(pH)**
1	Firm	7.5R 4/2	Clay Loam	7.56
2	Firm	7.5R 4/2	Clay Loam	7.81
3	Firm	7.5R 4/2	Clay Loam	7.37
High-density				
Point	**Measured values**			
	Soil Consistence	**Soil Color**	**Soil Texture**	**acid-base(pH)**
4	Firm	7.5R 4/2	Clay Loam	7.44
5	Firm	7.5R 4/2	Clay Loam	5.64
6	Firm	7.5R 4/2	Clay Loam	6.88

The table shows that both areas have the same soil cohesion, soil color, and soil texture Clay Loam .However, the area with lower Hill coconut density has a higher pH value than the area with higher density.

Table 6 Soil Fertility Analysis

Low-density (average)					
Point	**Soil Temperature (degree Celsius)**	**Soil Moisture(%)**	**N (mg/m^2)**	**P (mg/m^2)**	**K (mg/m^2)**
1	27.5	23.7	6	7.63	21.62
2	26.5	21.9	4.5	5.62	16.37
3	27.5	53.7	5.87	6.87	20.75
Average	27.17	33.1	5.46	6.71	19.58
High-density (average)					
Point	**Soil Temperature (degree Celsius)**	**Soil Moisture(%)**	**N (mg/m^2)**	**P (mg/m^2)**	**K (mg/m^2)**
4	27.5	34.4	11	13.75	37.75
5	25.25	17.5	0.5	0.62	2.25
6	26.85	30.2	8	10.21	26.33
Average	26.67	31.5	8	10.21	26.33

From the table, it is observed that the area with high Hill coconut density has an average temperature of 26.67 degrees Celsius. The soil nutrients show an average N value of 31.1 mg/m^2, an average P value of 10.21 mg/m^2, and an average K value of 26.33 mg/m^2. These values are higher than those in the low-density area, which has an average temperature of 27.17 degrees Celsius and soil nutrients with an average N value of 5.46 mg/m^2, an average P value of 6.71 mg/m^2, and an average K value of 19.58 mg/m^2.

Table 7 Light Intensity (LUX)

Low-density				
Point	**Morning light intensity (LUX)**	**Midday light intensity (LUX)**	**Evening light intensity (LUX)**	**Relative Humidity(%)**
1	301	180	186	83
2	267	612	277	86
3	12769	2506	1760	87
Average	4449	1099	741	85.33
High-density				
Point	**Morning light intensity (LUX)**	**Midday light intensity (LUX)**	**Evening light intensity (LUX)**	**Relative Humidity(%)**
4	684	360	647	82
5	30000	10000	6712	77
6	711.69	407.19	622.42	81.67
Average	10465.23	2589.06	2660.47	81.67

From the table, it is observed that the area with high Hill coconut density has higher light intensity. In the morning, the low-density area has an average light intensity of 10465.23 LUX, at midday 2589.06 LUX, and in the evening 2660.47 LUX, which is higher than the high-density area with 4449 LUX in the morning, 1099 LUX at midday, and 741 LUX in the evening. However, the low-density area has a relative humidity of 85.33%, which is higher than the high-density area with 81.67%.

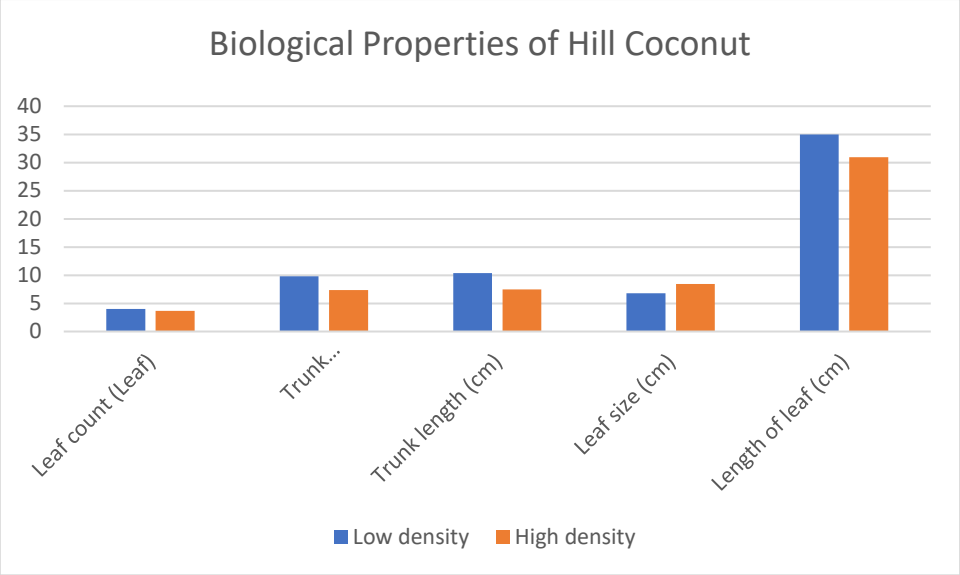

Chart 1 Biological Characteristics of Hill Coconut

The chart compares the biological characteristics of dwarf coconut trees with high and low densities, including the number of leaves, trunk size, trunk length, leaf size, and leaf length.

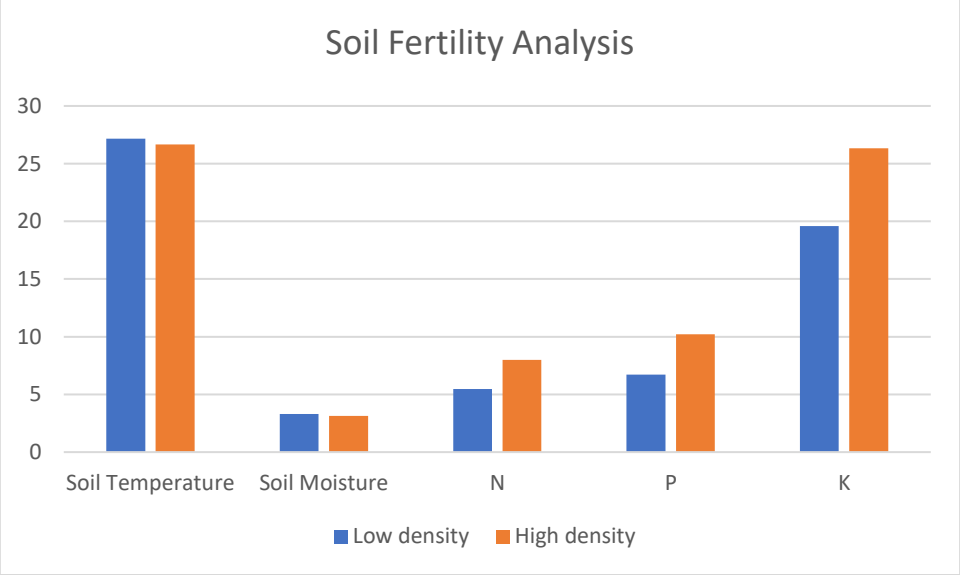

Chart 2 Soil Fertility Analysis

The chart compares the soil fertility analysis of areas with high and low density, including soil temperature, soil moisture, nitrogen, phosphorus, and potassium levels.

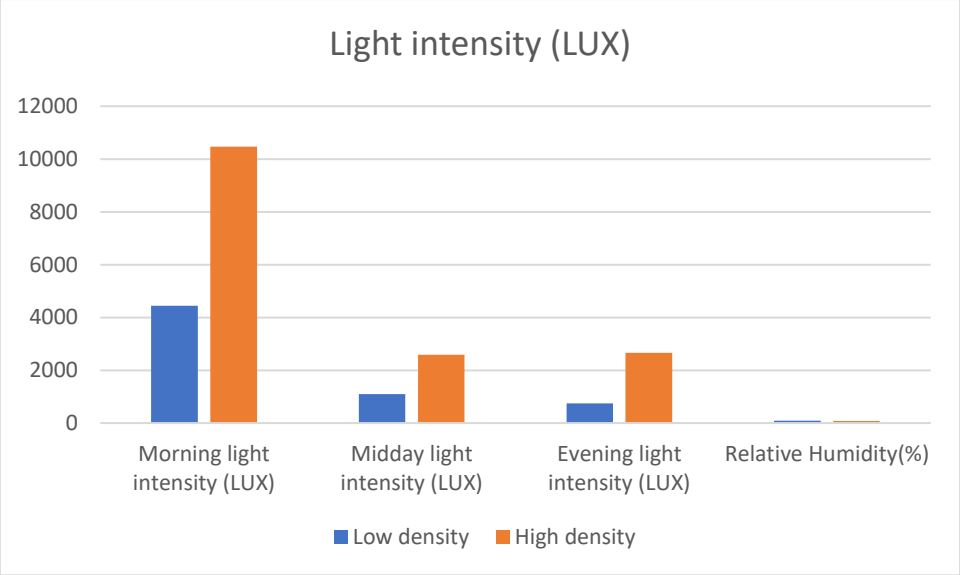

Chart 3 Light Intensity(LUX)

The chart compares the light intensity in areas with high and low density, including morning, midday, and evening light intensity.

Discussion of Research Results

1.Effects of Plant Density on Environmental Factors In areas with low plant density, there is more accessible light, and the average light intensity is higher than in areas with high plant density. The average soil and air temperature tends to be slightly higher in low-density areas, possibly due to more direct sunlight. Soil and air moisture is higher in areas with high plant density, likely due to plant transpiration and moisture retention under shade.

2.Soil Quality Soil pH in both areas did not differ significantly and was within the optimal range for plant growth. Nutrients (N, P, K) were found to be slightly higher on average in high plant density areas, possibly due to the decomposition of plant debris or the accumulation of organic matter.

3.Effects on Plant Growth In low plant density areas, the number of plants may be higher because new seedlings can germinate more easily, but the size of the plants and leaves may be smaller than in high plant density areas. In high plant density areas, the size of stems and leaves tends to be larger, but the number of plants may decrease due to competition in limited space.

3.Summary of Experimental Results

Plant density affects the environment and plant growth. Areas with low plant density have higher light and temperature but lower soil moisture and nutrients. Conversely, areas with high plant density provide a more humid environment with greater mineral accumulation, which may promote stronger plant growth. However, further studies on long-term plant growth rates are needed for more definitive conclusions.

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