A Study of Substance Properties Affecting the Yield of Thai Peanut Variety Nan 9 in Ban Fah Huan, Khaw Wang Subdistrict, Khaw Wang District, Yasothon Province, Thailand

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Abstract

This study investigated the effects of soil properties on the yield of Tainan peanuts in Ban Fah Huan, Khaw Wang District, Yasothon Province. Samples were collected from 10 plots and measured for temperature (°C), pH, soil moisture (%), organic matter, available phosphorus, available potassium, soil structure, cohesion, texture, and color. The results showed that the optimal yield per rai was achieved at site 10, with an average temperature of 22.70°C at 5 cm and 21.67°C at 10 cm depth, an average pH of 5.8, and an average soil moisture of 7.53%. The organic matter content in the soil (6) is between 0.26 -2.12. The available phosphorus (P) content is between 0-25 mg/kg (mg kg-1). The available potassium content is between 59-130 mg kg (mg kg-1). The soil structure is lumpy, very compact, and the texture is sandy loam. The soil colors found are SYR2/4, 25YR5/10, 75YR2/4, 75YR3/8, 75YRS/6.





Introduction

After rice farming, the primary occupation of farmers in Khaw Wang District, they cultivate peanuts as an additional income-generating crop. In Khaw Wang District, the Tainan 9 variety of peanut is popular due to its unique characteristics: smooth skin, thin shell, firm flesh, and sweet, nutty flavor, making it suitable for roasting. However, the main challenges in peanut production in Khaw Wang District, Yasothon Province, are low yield and quality. This is attributed to a lack of knowledge and technology among farmers regarding soil preparation, proper fertilizer management, pests, and diseases. Therefore, this study analyzed the impact of soil quality on peanut yield, with farmer participation in the analysis.

To inform farmers in the area about the soil quality suitable for growing Tainan peanuts, the results of this study can be used to help farmers learn about soil preparation, thereby increasing yields, reducing production costs, and ultimately increasing farmers' income. This could also encourage farmers in Yasothon province to consider growing Tainan peanuts as a new alternative crop.

Research Question

Does soil where Tainan peanuts are grown have different soil properties? If so, how?

Research Hypothesis

Areas where Tainan 9 peanut variety is grown have different raw material properties

Materials and Equipment

1. Thermometer (C)
2. Soil pH test kit.
3. Simple moisture-measuring oven, MEMMERT brand, model...
4. OHAUS brand weighing scale: Model CENT-O-GRAM balance 331g Capacity
5. Beaker
6. Portable Analysis Kit (SOM PK Test Kit)
7. Pedoshere (Soil) Protocol includes soil color, soil temperature, and soil structure.
8. Munsell soil color chart. Munsell codes are Hue Value and Croma

Research Methodology

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Research Results

A study of soil properties in areas where Tainan peanuts are grown in the study area of Ban Fah Huan, Khaw Wang Subdistrict, Khaw Wang District, Yasothon Province, yielded the following results:

Soil properties observed included variations in temperature, pH, soil moisture, organic matter, phosphorus, and potassium. Specifically, pH ranged from 4.70 to 5.80, temperature ranged from 21.33 °C to 24.00 °C, soil moisture ranged from 301% to 10.51% (average 7.53%), and soil organic matter (SOM) was around 0.26%.

2.12% Available phosphorus (P) values are between 12-18 mg kg-1) and available potassium (10) values are between 20 - 130 (mg/kg-1) in all 10 study sites (Table 1). Soil structure is granular, flattened, soil texture is loamy clay. Raw colors found include 5YR3/2, 5YR4/2, 7.5YR5/6 (Table 21).2)

Table 2. Soil quality under cultivation of Tainan peanut variety, study area, layer 1, depth 5 cm

Quality of the soil	Area where Tainan 9 peanut variety is grown (plot number).									
	ที่ 1	ที่ 2	ที่ 3	ที่ 4	ที่ 5	ที่ 6	ที่ 7	ที่ 8	ที่ 9	ที่ 10
SOIL STRUCTURE	lump	lump	lump	lump	lump	lump	lump	lump	lump	lump
seizing	Very tight	Very tight	Very tight	Very tight	Very tight	Very tight	Very tight	Very tight	Very tight	Very tight
SOIL TEXTURE	SLC	SLC	SLC	SLC	SLC	SLC	SiCL	SLC	SLC	SLC
Soil Color	75YR3/8	75YR3/8	5YR2/4	5YR2/4	75YR2/4	5YR2/4	25YR5/10	75YR2/4	75YR2/4	75YR5/6

Properties of soil	Area where Tainan 9 peanut variety is grown (plot number).										average
	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	
Depth 5 cm. Temperature (°C)	23.33	22.67	21.33	23.00	22.67	22.33	20.33	24.00	24.00	23.33	22.70
Depth 10 centimeters, Temperature (°C)	23.00	21.00	21.00	22.00	22.33	20.00	21.67	23.00	23.00	22.33	21.67
pH values (acidity-difference)	4.93	4.83	4.70	4.80	4.80	5.17	5.20	5.30	4.93	5.80	5.05
Soil moisture (%)	8.25	5.95	9.04	3.09	10.51	5.84	6.51	4.22	6.83	5.02	7.53
Organic matter in soil (%)	2.12	2.12	2.12	1.50	2.12	1.04	1.50	0.26	2.12	2.12	-
Phosphorus (P)	18	18	18	18	25	0	0	18	18	12	-
Potassium (K)	59+++	78+++	59+++	59+++	78+++	78+++	59+++	78+++	78+++	130	-

Soil quality was found to be cohesive with a dense structure. The soil texture consisted of sandy loam and silty clay loam. Soil colors observed included 5YR2/4, 25YR5/10, 75YR2/4, 75YR3/8, and 75YR5/6, as shown in Table 2.

Conclusion and Discussion

From the study results of soil properties in the 10 study sites, it was found that the study site with the most suitable temperature, pH, soil moisture, and organic matter was site 10, which had an average temperature of 22.70°C at a soil depth of 5 cm and an average temperature of 21.67°C at a soil depth of 10 cm. The average soil pH was 5.8, and the average soil moisture was 7.53%. This site yielded the highest production per rai. The percentage of organic matter in the soil ranged from 0.26 to 2.12. The amount of available phosphorus (P) ranged from 0 to 25 mg/kg (mg kg-1). The amount of available potassium ranged from 59 to 130 mg/kg (mg kg-1). The soil structure was agglomerated, very compact, and the soil texture was sandy loam. Soil colors found include 5YR2/4, 25YR5/10, 75YR2/4, 75YR3/8, and 75YR5/6, consistent with the research by Parichat et al. (2014) which studied soil properties. Peanuts are grown throughout Thailand, preferably in loamy, sandy loam, or clay loam soils with moderate fertility, good drainage, and aeration, with a pH between 5.5-6.5. However, differences in temperature, pH, and soil moisture affect the yield per acre. Considering the soil properties, it can be seen that even small differences in soil properties can significantly alter the yield.

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