

# Study Quantity of Potassium in the Soil Convert the Banana Musa (AA group) 'Kluai Khai', Mueang District, Kamphaeng Phet Province, Thailand.

N. Keereechnakun, W. Suanmali

*Environmental of Science Program, Faculty of Science and Technology, Kamphaeng Phet University, Kamphaeng Phet, 62000, Thailand*

## Abstract

This research aims to study potassium in soil for banana (Musa (AA) 'Khai') in Sakaeo sub district, Mueang district, Kamphaeng Phet Province. The physical properties of soil were studied covering three major periods i.e., planting period, blossom period and post-harvesting period. The research found that the temperature between 27-30 °C is the most suitable temperature for growing bananas. The best pH value is between 5.62-7.94 which suggests medium acid level of the soil. The soil moisture content is between 5.32 -6.65% and the electrical conductivity of the soil is between 1.62-1.89 ms cm<sup>-1</sup> which is in a low level. Organic Matter soil of planting period is between 0.52% to 0.94% that is in a low level. Potassium in the soil is between 68.75 to 82.22 mg kg<sup>-1</sup> which is in a high level.

*Keywords: Musa (AA group) 'Kluai Khai', Potassium*

## 1. Introduction

Klauri Khai is the economic plant and symbolic of Kamphaeng Phet Province. Kamphaeng Phet has been well-known from its famous species of banana. Klauri Khai that is grown in Kamphaeng Phet has a unique sweet taste with good intensive texture. Although, this Klauri Khai has been cultivated in other places, however those bananas do not have as good taste as the ones from Kamphaeng Phet. It would taste sour, not sweet, and does not have sweet fragrance like the ones in Kamphaeng Phet. Because the soil of Kamphaeng Phet is mold mixing with sand. It can keep water and drain water well. It contains high organic matter soil which is suitable for the growing Klauri Khai. The soil contains various minerals that sufficient in growing plants and the bananas' roots can embrace the soil to find its food, water, and air. If the plant is lack of nourish, it would affect the growing rate and produce less products. The nutrition is also important to the quality of fruits such as size, shape, color, and taste (sweet, sour, bitter, acidulous). Those compositions depend on the nutrient in soil. The important nutrient that influence the sweetness of Klauri Khai is the potassium (K) [1]. The potassium (K) is an element that assist in the protein, sugar and starch synthesis process. It supports the moving of sugar from leave to fruit ratio. If the plant contains insufficient potassium, they would have low quality, bad colors, and terrible taste. For instance, sugarcane and coconut, need high potassium. Without potassium, sugarcane produces less sugar and the coconut does not contain enough fat. Potassium gives the sweetness in fruits. When planting Klauri Khai in a sufficient potassium (K) condition, it produces good quality fruits with sweet taste. The researchers are interested in studying the available potassium quantity in soil for Klauri Khai that influence the sweet of Klauri Khai of Kamphaeng Phet.

## 2. Methodology

2.1 Survey the fields for planting Klauai Khai in Mueang District, Kamphaeng Phet to set the sampling sites by setting the coordinates and making geographic map (Figure 1).

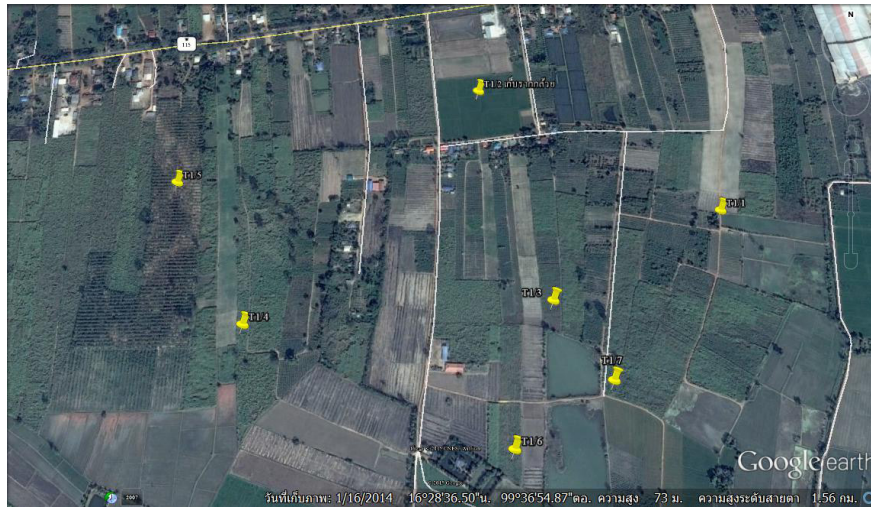


Figure 1 Geographic mapping for sampling sites

2.2 Collecting soils from 14 sampling plots during the three major periods as described above. Then determine their chemical and physical properties of sampling plots (Table 1)

Table 1 Factors of chemical and physical properties in Klauai Khai sampling plots

Quality factors	Unit	Analysis
1. Temperature	°C	Thermometer
2. Conductivity	$\mu\text{S}$	Conductivity meter
3. pH	-	pH meter
4. organic matter	%	Oxidizing agent titration by reduce synced agent
5. Useful potassium in plants	$\text{mg kg}^{-1}$	Flame spectrophotometer

2.3 A study of potassium in soil for planting Klauai Khai (Figure 2)

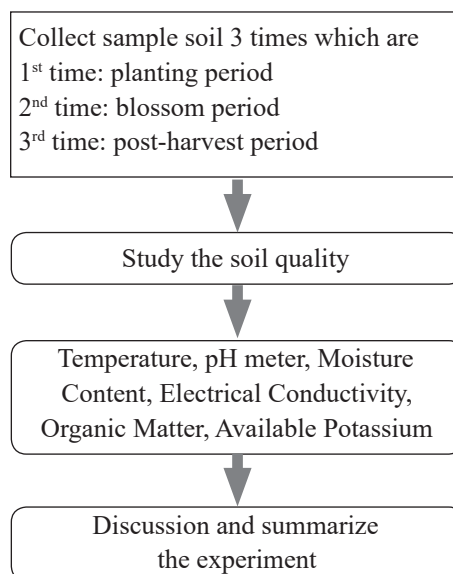


Figure 2 Methodology

### 3. Results

According to the study of the potassium quantity in soil for planting Klaui Khai, Sra-kaew subdistrict, Mueang District, Kamphaeng Phet, the researchers examined three major period i.e., planting period, blossom period and post-harvesting period. Six sampling soils were collected. This study examined the physical properties such as temperature, pH level, moisture content, electrical conductivity, organic matter and the potassium quantity. The results during plating period, blossom period and post-harvesting period are shown Table1, Table 2, and Table3 respectively.

**Table 2** Physical properties of soil during planting period

Sampling Site	Temperature (°C)	Acid-Base (pH)	Moisture (%)	Electrical conductivity (ms cm <sup>-1</sup> )	Organic Matter (%)	Potassium (mg kg <sup>-1</sup> )
1 <sup>st</sup>	28.00	6.80	6.63	1.71	0.61	77.40
2 <sup>nd</sup>	29.00	5.63	5.32	1.70	0.52	79.00
3 <sup>rd</sup>	28.00	5.71	5.80	1.76	0.56	76.92
4 <sup>th</sup>	29.00	5.69	6.15	1.89	0.72	76.70
5 <sup>th</sup>	29.00	5.80	6.65	1.77	0.76	78.75
6 <sup>th</sup>	29.00	6.08	6.53	1.62	0.61	82.23

From Table 2, the study of soil during planting period found that average temperature is between 28.00-29.00°C. An average pH is between 5.63- 6.80. An average moisture content is between 5.32-6.65%. An average electrical conductivity is between 1.62-1.89 ms cm<sup>-1</sup>. An average organic matter is between 0.52% - 0.76% and the average potassium amount is between 76.70 – 79.00 mg kg<sup>-1</sup>.

**Table 3** Physical properties of soil during blossom period

Sampling Site	Temperature (°C)	Acid-Base (pH)	Moisture (%)	Electrical conductivity (ms cm <sup>-1</sup> )	Organic Matter (%)	Potassium (mg kg <sup>-1</sup> )
1 <sup>st</sup>	28.00	6.56	8.06	1.77	0.72	79.65
2 <sup>nd</sup>	28.00	5.78	7.46	1.68	0.76	68.98
3 <sup>rd</sup>	27.00	5.67	7.50	1.74	0.82	78.90
4 <sup>th</sup>	28.00	6.42	7.39	1.77	0.94	81.08
5 <sup>th</sup>	28.00	5.65	6.37	1.72	0.78	71.65
6 <sup>th</sup>	29.00	7.30	6.37	1.75	0.61	68.75

From Table 3, the study of soil during blossom period discovered that an average temperature is between 27.00-29.00 °C. The average pH is between 5.65- 7.30. An average moisture content is between 6.37% - 8.06%. An average electrical conductivity is between 1.68-1.77 ms cm<sup>-1</sup>. An average organic matter is between 0.61 % - 0.94% and an average available potassium is between 68.75 – 81.08 mg kg<sup>-1</sup>.

**Table 4** Physical properties of soil during post-harvesting period

Sampling Site	Temperature (°C)	Acid-Base (pH)	Moisture (%)	Electrical conductivity (ms cm <sup>-1</sup> )	Organic Matter (%)	Potassium (mg kg <sup>-1</sup> )
1 <sup>st</sup>	28.00	6.83	8.67	1.89	0.56	79.08
2 <sup>nd</sup>	28.00	5.62	9.22	1.62	0.72	82.25
3 <sup>rd</sup>	29.00	5.79	8.11	1.72	0.72	68.98
4 <sup>th</sup>	30.00	6.52	7.39	1.83	0.76	79.01
5 <sup>th</sup>	29.00	5.76	8.74	1.68	0.61	78.56
6 <sup>th</sup>	30.00	7.94	8.92	1.62	0.72	77.13

From Table 4, the study of soil during planting period found that average temperature is between 28.00-30.00°C. An average pH is between 5.62- 7.94. An average moisture content is between 7.39-9.22%. An average electrical conductivity is between 1.62-1.89 ms cm<sup>-1</sup>. An average organic matter is between 0.56-0.76% and an average available potassium is between 68.98 – 82.25 mg kg<sup>-1</sup>.

#### 4. Discussion and conclusion

The study of potassium quantity in Klauai Khai planting plots in Sra-kaew subdistrict, Mueang District, Kamphaeng-phet, during the three major periods i.e., planting, blossom and post-harvesting period. The study examined physical properties of soil for planting Klauai Khai. The result discovered that the temperature is between 27-30 °C. The pH is from 5.62 to 7.94 which is in medium range. According to Boonsaen Teawnukooltam (2004) [2], K<sup>+</sup> ion of potassium should be beneficial to the plants as pH is in either medium acid or alkaline range. The moisture content is between 5.32- 6.65%. The moisture content is quite low so the cultivators should have the watercourse to increase and preserve the moisture in soil. The electronic conductivity is between 1.62-1.89 ms cm<sup>-1</sup> that is in low level, not salty and does not influence the growing of plants. The organic matter of soil in planting period is between 0.52-0.94% that is in low level of organic matter.

Potassium in soil is between 68.75-82.23 mg kg<sup>-1</sup> which is an appropriated level. The upland soils have lower potassium than lowland soils, therefore, the lowland soils have more spare potassium than upland soils. The intensity of potassium in upland soils ( $r_2 = 0.51$ ) and lowland soils ( $r_2 = 0.70$ ) [3]. The soil property is acid with humid climate, lots of rains so the important nutrient got wash out. Therefore, it affect the exuberance of soil if soils are lack of plant growing [4].

The soil analysis shown that most soils are lack of fertile so the agriculturalists should manage the nutrient by using fertilizer and organic matter to recondition the soils regularly and to manage nutrition efficiently to invest. Moreover, it produces a good quality and tasty Klauai Khai which has many demands from the domestic and international consumers. The agriculturalists should also collect the samples to analyze the nutrient quantity. The knowledge from this study can further extend and develop the quality of Klauai Khai, Kamphaeng Phet to be better and more durable to plant disease.

#### Acknowledgements

This research was financially supported by Environmental Science Program, Faculty of Science and Technology, Kamphaeng Phet Rajabhat University are gracefully acknowledged.

#### References

- [1] Local database. "Klauai Khai specie Kamphaengphet" [online system] Retrieved from <http://arit.kpru.ac.th/rlocal/index.php/2014-06-11-03-53-28/31-2014-06-11-03-21-40/folk-wisdom-kamphaeng-phet/111-2014-06-11-07-48-40>. Access: 9 March 2015.
- [2] Boonsean Tealnugutoom. "Nutrient in Soil." Faculty of Science and Technology, Nakhonsawan Rajabhat University. 2004, p.79-89.
- [3] Chakkrit Poonpakdee. 2013. Potassium forms in upland and lowland rubber growing soils in Songkla Province.
- [4] Siranee Wongkrachang and Bancha Maneetoo. 2014. Acid Soil Management by Using the Lime and Organic Matter.