Soil Quality and Climate Affect Sweetness of Mangosteen in Nakhon Si Thammarat Provice, Southern Thailand

by:

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Abstract

In Cha-uat District, Nakhon Si Thammarat, Southern Thailand, there is a large number of mangosteen cultivation. The research aims to determine and analyze the significant effect of soil quality and climate on the sweetness of mangosteen. Ban Tha Samet Subdistrict and Ban Lan Na Subdistrict were chosen as the study area.

By sampling, 16 plants were selected and 8 soil samples were collected from each plant. The soil quality with temperature 28.2° C, moisture 20.5%, pH 6.5 (weak acid) with lower quantity of N, P, K produced mangosteen with 23.8 sweetness in Ban Tha Samet Subdistrict. Whereas, the sweetness of mangosteen in Ban Lan Na was 23.2, soil temperature and moisture were lower (27.2° C and 21.9, respectively), pH 5.5 (medium acid), both N and P quantity were lower, while K quantity resulted medium.

In addition, it was found that climate with air temperature 30.6° C and relative humidity 73.3 produced mangosteen with 23.8 sweetness in Ban Tha Samet. Whereas, the air temperature and relative humidity in Ban Lan Na were 30.7° C and 77.9, respectively. These results produced mangosteen with 23.2 sweetness. Therefore, the lower the humidity and higher the temperature, the sweeter the fruit taste.

Furthermore, the researchers were able to compare the size of mangosteen to determine the sweetness. They found out that the mangosteen in Ban Tha Samet was bigger than Ban Lan Na. Thus, the fruit harvested in Ban Tha Samet were sweeter than Ban Lan Na area.

Evidently, the research shows that soil quality and climate affect sweetness of mangosteen.

Introduction

Southern Thailand is well-known for its high quality and best-tasting Mangosteen.

In fact, there is a large number of mangosteen cultivation in Cha-uat District, Nakhon Si Thammarat Province, Southern Thailand. The taste of the mangosteen cultivated and grown in the said district were found different. In line with this, the researchers would like to investigate and examine if soil quality and climate in different locations have significant effects on the sweetness of mangosteen.

Ban Lan Na Subdistrict and Ban Tha Samet Subdistrict were chosen as the study area of the research. The soil quality from these locations will be examined in terms of pH, soil moisture, soil temperature, and soil mineral content. Climate, relative humidity, and air temperature will also be examined.

The size of the fruit will be measured by investigating two points: *(1)* crops cultivated in Ban Lan Na plantation with a height of 22 meters above sea level and *(2)* in Ban Tha Samet garden with a height of 17 meters above sea level.

Data will be collected in September, the time of harvest. By sampling, 16 plants were selected and 8 soil samples were collected from each plant.

The results show that soil quality and climate can affect the taste of the mangosteen. The higher the pH, the higher the soil temperature, the lower the soil moisture, the higher the air temperature, the lower the relative humidity, --- will produced best-tasting or sweetest mangosteen.

Research Question

1. **Does the quality of soil affect the sweetness of mangosteen?**
2. **Does climate affect the sweetness of mangosteen?**
3. **How does the size affect the sweetness of mangosteen?**

Research Hypothesis

1. **Soil Quality affects the sweetness of mangosteen.**
2. **Weather affects the sweetness of mangosteen.**
3. **Large fruit mangosteen is sweeter than small one.**

Methods and Materials

- **Study Area**

  a. **Ban Tha Samet Village No. 5, Tha Samet Sub-district, Cha-uat District, Nakhon Si Thammarat 80180, Thailand**
     - **Latitude 75544 W, Longitude 99.59, Elevation 17 M**

  b. **Ban Lan Na Village No. 3, Koh Khan Sub-district, Cha-uat District, Nakhon Si Thammarat 80180, Thailand**
     - **Latitude 7.54 ’21 N, Longitude 99.57 / 06E, Elevation 22 M**

Materials

The materials used in this research are listed below:

- **To analyze the soil and air quality**

  - **Soil quality**
  - **Hygrometer**
  - **Thermometer**
  - **Tape measure**
  - **Digital Scales**
  - **Carrier bag (capacity 1 kg)**
  - **Rubber band**
  - **Digging shovel / garden shovel / hoe**
  - **Hammer**
  - **Permanent marker**
  - **Aluminum cup**
  - **Clay incubator**

- **To determine and measure the sweetness**

  - **Sweetness meter**
  - **Basin, bowl, and foam plate**
  - **Dropper**
  - **Beaker**
  - **Cloth filter**
  - **Fruit blender**

Methods

The researchers prepared a list and labeled the mangosteen tree.

- **Soil Sampling**

  - **Mangosteen samples were done through random selection.**
  - **Measure the canopy in all 8 directions and dig a hole 30 centimeters in depth to measure the soil temperature. 3 times each and save the result.**
  - **Collect soil in 8 directions of each plant and put in the same bag and tie with the rubber. Write their numbers in front of the carrier bag.**

- **Sweetness Measurement**

- Ten mangosteen fruits per plant were collected from the sampling. Ensure that their original numbers were written on the fruit
- Separated them per locations before extracting the juice and blending or grinding the meat.
- Filtered the blended meat with white cloth.
- Used a dropper to get the extracted juice from the beaker and put it onto the sweetness measurement.
- Read and accurately record the results.

- **Measurement of Relative Humidity and Air Temperature**

  - Relative humidity and air temperature were measured using hygrometer and thermometer, respectively.

- **Data analysis**

  - Mean was used in statistical data analysis.

Research Result

Table 1 : Result of analysis of the Soil Quality and Sweetness in Ban Tha Samet and Ban Lan Na

Area	Soil Temperature (oC)	Soil Moistrue (%)	pH	Quantity			Sweetness (Brix)
				N	P	K	
Ban Tha Samet	28.2	20.5	6.5 Weak acid	Lower	Lower	Lower	23.8
Ban Lan Na	27.2	21.9	5.5 Medium acid	Lower	Lower	Medium	23.2

The table shows that soil temperature is higher and soil moisture is lower in Ban Tha Samet. The pH value is higher and the mineral content is lower than Ban Lan Na. The mangosteen in Ban Tha Samet has a higher sweetness value.

Table 2 Result of Analysis of the Air Quality and Sweetness

in Ban Tha Samet and Ban Lan Na

Area	Air Temperature (oC)	Relative Humidity	Sweetness (Brix)
Ban Tha Samet	30.6	73.3	23.8
Ban Lan Na	30.7	77.9	23.2

The table shows that Ban Tha Samet has an average air temperature of 30.6 degrees with a relative rise of 73.3% with a sweetness value of 23.8 while Ban Lan Na has an average air temperature of 30.7 degrees and relative humidity of 77.9% with 23.2 sweetness.

Table 3 : Analysis of Mangosteen Sweetness based on the Circumference

Area	Circumference (cm.)	Sweetness (Brix)
Ban Tha Samet	4.6	23.8
Ban Lan Na	4.5	23.2

The table shows that mangosteen with higher circumference was found sweeter than the smaller one.

Conclusion

1. It is concluded that the soil quality had an effect on the sweetness of the fruit. Thus, the mangosteen from Ban Tha Samet has the sweetest taste.

2. Evidently, the mangosteen cultivated and grown with lower relative humidity and higher air temperature was found the sweetest.

3. As expected, the mangosteen with large size has the sweeter taste than the smaller one.

Discussion

Based on the research, the sweetness of mangosteen was significantly different in Ban Tha Samet and Ban La Na. Clearly, the soil quality and climate can effect the sweetness of mangosteen. The higher the pH, the higher the soil temperature, the lower the soil moisture, the higher the air temperature, the lower the relative humidity, --- will produce best-tasting or sweetest mangosteen.

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