

Title : Climate Condition, Mineral Contents in Soil Before Planting, Use of Chemical Fertilizers, and Water Quality Affecting Length, Weight, and Nutritional Values of Rice Varieties RD79 (Chai Nat 62)

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Abstract:

Baan Prao Subdistrict, Pa Phayom District, is considered an important source of rice and water in Phatthalung Province, or there are various types of rice cultivation, both in-season rice field and off-season paddy field, because of irrigation system in Ban Bo Sai Community, located in Ban Prao Subdistrict, Rice Varieties RD79 cultivations and rice farming for several consecutive years, and use of 16-20-0 fertilizer and 46-0-0 urea fertilizer every year. As a result, the researchers wonder whether rice cultivation in the each-year climate conditions and water quality in the rice fields affects the length and weight of the grains and the nutritional value of the rice.

This project research aimed to study soil quality, water quality, climate conditions and nutritional value of the rice gained from in-season rice field cultivated in September 2020 and harvested in February 2021. The samples used in this research were collected in 1 rice field, 5 points, 5 repeats each. It was found that the nitrogen and phosphorus contents in the soil before planting were low, and potassium content was moderate. For water quality, pH was an average of 3.54, and turbidity was 25.9 cm with the average water temperature of 13.51 °C. For air quality, the highest average temperature in September was 33.5 °C, and the lowest temperature in October was 31.0 °C, as well as grains with length of 7.0-1.29 mm, and grains were most found to length of 10.0-10.9 mm, accounting for 36 percent. The weight of grains was not different, but the value was in the range of 20-30 mg.

For nutritional value, energy was 354.04 kcal per 100 grams; 76.59 grams of carbohydrate per 100 grams; 7.36 grams of protein per 100 grams; 2.08 grams of fat per 100 grams; and 10.30 grams of fiber per 100 grams.

Keyword : rice varieties RD 79, soil quality in rice field, Pa Phayom, do rice farming, inutritional value of the rice varieties RD 79

Introduction :

Baan Prao Subdistrict, Pa Phayom District, is considered an important source of rice and water in Phatthalung Province, or there are various types of rice cultivation, both in-season rice field and off-season paddy field, because of irrigation system in Ban Bo Sai Community, located in Ban Prao Subdistrict, Rice Varieties RD79 cultivations and rice farming for several consecutive years, and use of 16-20-0 fertilizer and 46-0-0 urea fertilizer every year. As a result, the researchers wonder whether rice cultivation in the each-year climate conditions and water quality in the rice fields affects the length and weight of the grains and the nutritional value of the rice.

Therefore researcher interested to study soil quality before planting, use of fertilizer, climate conditions, water quality in rice field. Researchers took measurements from in-season rice field cultivated in September 2020 and harvested in February 2021 for further information on soil improvement.

Research Questions

1. How does the amount of mineral content in the soil before planting affect the size of the grains?
2. How does the use of 16-20-0 and 46-0-0 fertilizers affect the size of the grains?
3. How does the water quality affect the size of the grains?
4. How does the climate conditions affect the size of the grains?

Research Hypothesis

1. The mineral content in the soil before rice cultivation is low which results in low weight and short grain.

2. The use of 16-20-0 and 46-0-0 fertilizers will get grains with standard weight and length.
3. Water quality affects weight and length of grains.
4. Climate conditions (September 2021 – January 2021) affect weight and length of grains.

Material and Methods

1. How to determine study points

1.1 Study points



Figure 1 show study point, latitude 7.8460063 °N . longitude 99.98434°E, heightabove sea level 13 m ([a shorturl.at/opsvK](https://a.shorturl.at/opsvK))

- 1.2 Researchers collected soil sampling in September and collected water quality in December 2020. The sample used in this research were collected in 1 rice field, 5 points, 5 repeats each.

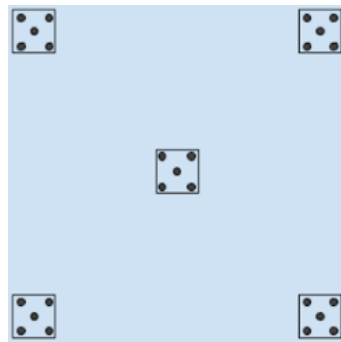


Figure 2 Show schematic collected soil sampling and collected water quality in rice field.

2. How to conduct measurements

2.1 Climate Condition

Used information from the website ([a shorturl.at/hpACI](http://a.shorturl.at/hpACI))

2.2 Mineral Contents in Soil

2.2.1 Extraction

- 1) Measure soil sample by Using a measuring spoon Tap gently against the palm 3 time let the soil collapse, use a stainless steel sheet to scrape off the excess soil.
- 2) Put the soil in a plastic bottle, add 20 ml of extractor No. 1, pour the extract into a plastic cup first, then pour it into a measuring cylinder, close the lid, shake the soil to react with the extract for about 5 minutes.
- 3) Filter the soil solution using the prepared filter paper, then the filter can be further checked for the N-P-K content in the soil.

2.2.2 Ammonium

- 1) Take 2.5 ml of filtered water from a receptacle flask into a glass tube, add a small spoonful of No. 2 powder.
- 2) Add 5 drops of liquid No.3
- 3) Cover the glass tube with a rubber stopper.
- 4) Shake well and leave for 5 minutes.
- 5) Read the " Ammonium" values By comparison with the standard color sheet If the tone is blue, use "Color Block No. 1" but if there is green tone, use "Color Block No. 2"

2.2.3 Phosphorus

- 1) Take 2.5 ml of filtered water from a support flask into a glass tube - add 0.5 ml of solution no.6
- 2) Add a small spoonful of No.7 powder, cover the glass tube with a rubber stopper.
- 3) Shake well and leave for 5 minutes.
- 4) Read the "Phosphorus" value compared to the standard color sheet.

2.2.4 Potassium

Before checking the potassium content, the “solution number 9” must be prepared by sucking the filtered water from the 3 ml bottle provided into the number 9 vial containing the chemical powder, shaking it together for 5 minutes until the chemical powder dissolves completely. The orange-brown solution, when used, is stored in the refrigerator, in a normal compartment for up to 3 months, if stored at room temperature, usually only 7 days.

- 1) Take the filtered water from a 0.8ml support flask into a glass tube.
- 2) Add solution number 8 to 2.0 ml. (Do not shake)
- 3) Add 1 drop of solution No. 9A (do not shake)
- 4) Add 2 drops of liquid no.9 (do not exceed)
- 5) Cover the glass bulb with a rubber stopper.
- 6) Shake well and read "potassium" immediately.
If there is "sediment" read as "K" high
If there is "white blemish" read "K" moderate
If clear, read "K" low

2.2.5 Soil pH

- 1) Put the soil in half a white hole tray.
- 2) Gradually add solution No. 10 until the soil is gradually saturated with solution. And add 2 more drops of liquid
- 3) Tilt the tray back and forth, set aside for 1 minute.
- 4) Read the value (color) and write down the result.

2.3 Grain size (weight/ Number of grain)

2.3.1 Take the random grain in sacks and measure them with a ruler. Divided into sizes as follows: 7.00 - 7.99, 8.00 - 8.99, 9.00 - 9.99, 10.00 - 10.99, 11.00 - 11.99, 12.00 - 12.99 mm.

2.3.2 Weighed every size of 100 rice kernels. And note the results.

2.4 water quality

2.4.1 Water pH measurement

- 1) Wash a beaker with water samples. Then, pour 50 ml of the sample into the beaker. Clean the pH probe with distilled water and dry the probe before use.
- 2) immerse the probe into the sample and wait until the meter reads. Record the readings.

2.4.2 Water temperature measurement

- 1) Wash a beaker with water samples. Then, pour 50 ml of the sample into the beaker. Clean the pH probe with distilled water and dry the probe before use.
- 2) immerse the probe into the sample and wait until the meter reads. Record the readings water temperature.

2.4.3 Water transparency measurement

- 1) Pour water samples into transparency tube.
- 2) Look at the secchi disk until the black/white stripes disappear and record the readings (cm).

Results

1. Mineral contents in soil and grain size.

Table 1 Show mineral contents in soil and grain size.

Mineral contents in soil			Grain size.	
N	P	K	length (mm.) (\bar{x})	weight (mg.) (\bar{x})
Low	Low	moderate	10.00	23

From the table it was found that mineral contents in the soil before planting the nitrogen and phosphorus contents were low, and potassium content was moderate. There is a length average of 10.00 mm. and a weighted average of 23 mg. Water quality and grain size.

2. Water quality and grain size.

Table 2 Show water quality and grain size.

Water quality			Grain size.	
Water pH	Water transparency- (cm)	Water temperature (°C)	length (mm.) (\bar{x})	weight (mg.) (\bar{x})
3.54	25.9	13.51	10.00	23

From the table it was found that pH was an average of 3.54, and turbidity was 25.9 cm with the average water temperature of 13.51 °C.

3. Climate Condition for September 2020 – January 2021

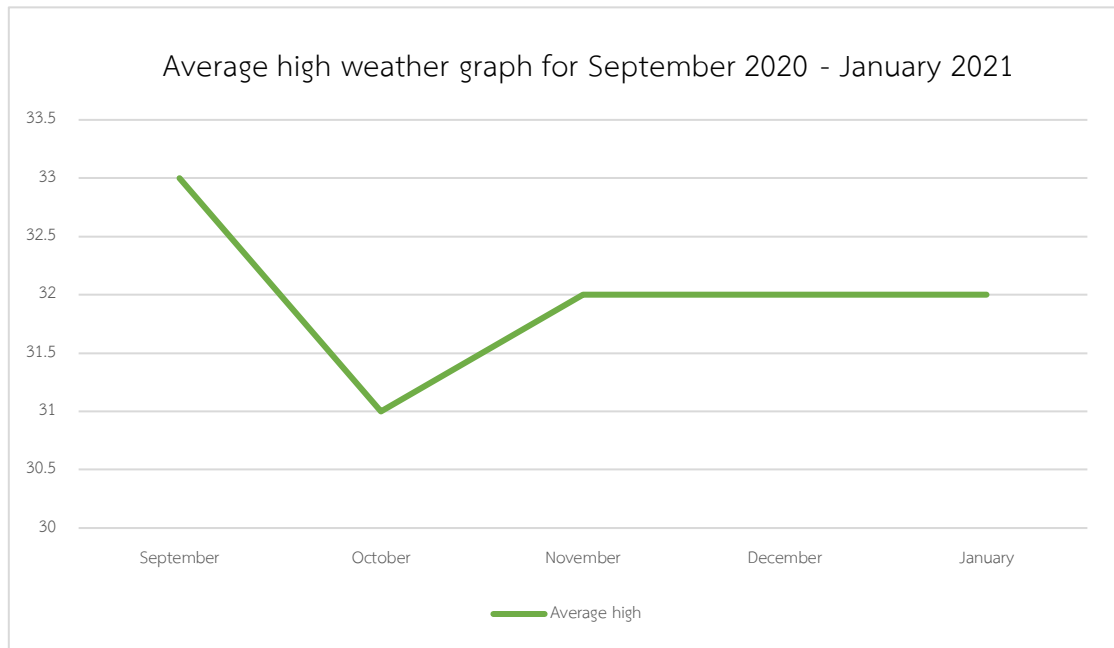


Figure 3 Average high weather graph for September 2020 - January 2021

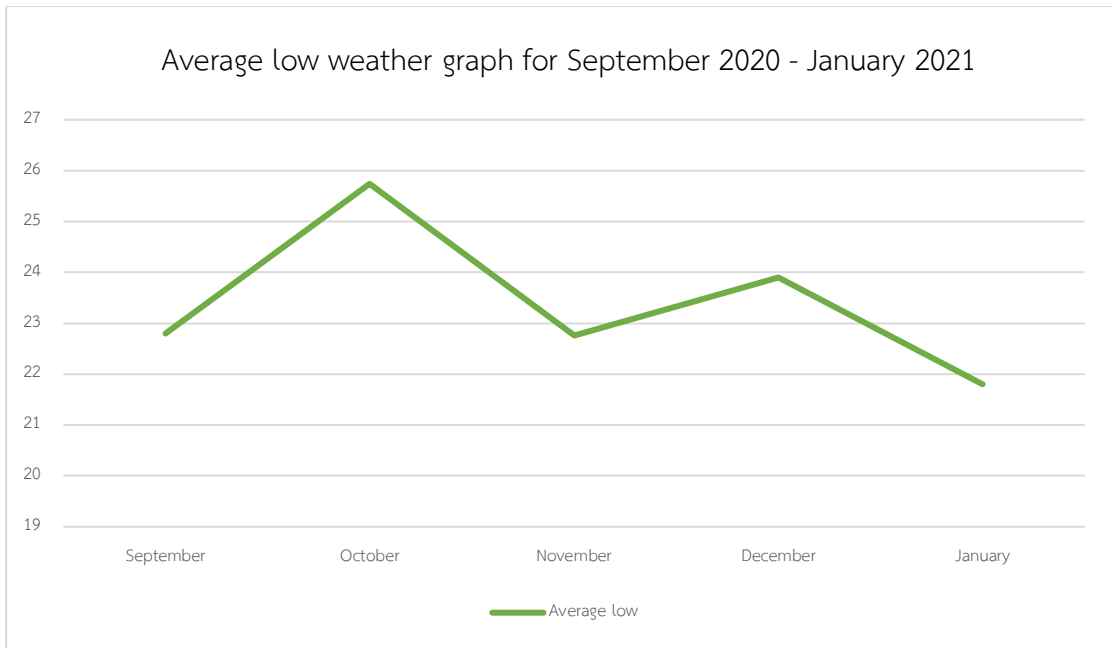


Figure 4 Average low weather graph for September 2020 - January 2021

4. Grain size

Table 3 Show length, % of the number of grain and a weight of grain

length (mm.)	% Of the number of grain	Weight / grain (mg.)
7.00 - 7.99	1 %	20
8.00 - 8.99	8 %	20
9.00 - 9.99	19 %	20
10.00 - 10.99	36 %	20
11.00 - 11.99	25 %	30
12.00 - 12.99	11%	30

From the table it was found that the grains were most found to length of 10.0-10.9 mm, accounting for 36 percent. The weight of grains was nothing to do with length. the value was in the range of 20-30 mg.

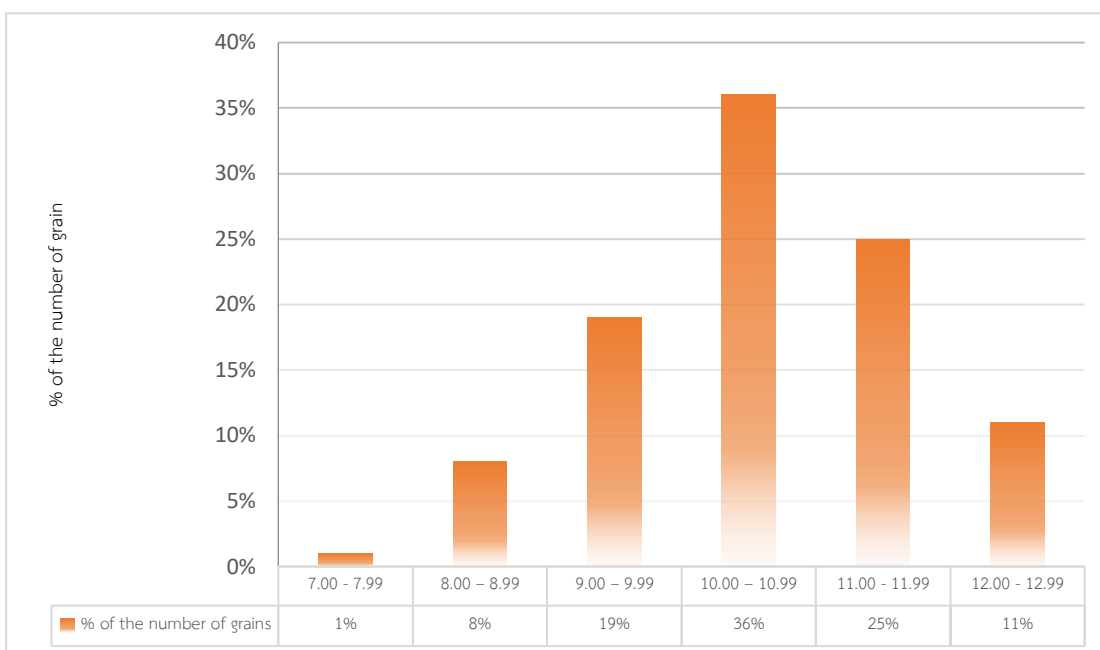


Figure 5 Graph showing grain length and percentage of found length.

5. Nutritional value

Table 4 Show the nutritional value of paddy of rice varieties RD 79.

Nutrient					
Nutrient content per 100 grams	Energy (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Fiber (g)
Raw brown rice	347	75.1	7.1	2.0	2.1
Paddy varieties RD 79	354.04	76.59	7.36	2.03	10.30

Discussion and Conclusions

From study soil quality, water quality, climate conditions and nutritional value of the rice gained from in-season rice field cultivated in September 2020 and harvested in February 2021. The samples used in this research were collected in 1 rice field, 5 points, 5 repeats each. It was found that the nitrogen and phosphorus contents in the soil before planting were low, and potassium content was moderate.

For water quality, pH was an average of 3.54, and turbidity was 25.9 cm with the average water temperature of 13.51 °C. For air quality, the highest average temperature in September was 33.5 °C, and the lowest temperature in October was 31.0 °C, as well as grains with length of 7.0-1.29 mm, and grains were most found to length of 10.0-10.9 mm, accounting for 36 percent. The weight of grains was not different, but the value was in the range of 20-30 mg. For nutritional value, energy was 354.04 kcal per 100 grams; 76.59 grams of carbohydrate per 100 grams; 7.36 grams of protein per 100 grams; 2.08 grams of fat per 100 grams; and 10.30 grams of fiber per 100 grams. The mineral contents in soil before planting had no effect on the grain size and the nutritional value of rice. Depend on use of chemical fertilizers. The nutritional value was higher than the standard. Both energy, carbohydrate, protein, and fiber.

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Citation

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